HP StorageWorks

Fabric OS 5.0.0 Advanced Web Tools

user guide

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invent

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Fabric OS 5.0.0 Advanced Web Tools user guide

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About this guide

This document provides information to assist fabric administrators in using the web-based graphical user interface (GUI) to monitor and modify their HP StorageWorks switch fabrics.

This preface discusses the following topics:

- Intended audience, page 9
- Related documentation, page 9
- Document conventions and symbols, page 10
- HP technical support, page 11

Intended audience

This book is intended for use by those responsible for monitoring and modifying their HP StorageWorks switch fabric.

Related documentation

Documentation, including white papers and best practices documents, is available via the HP website. Please go to:

http://www.hp.com/country/us/eng/prodserv/storage.html

To access 4.x related documents:

1. Locate the **Networked storage** section of the web page.
2. Under **Networked storage**, go to the **By type** subsection.
3. Click **SAN infrastructure**. The SAN infrastructure page displays.
4. Locate the **Fibre Channel Switches** section.

   Locate the **B-Series Fabric** subsection, and then go to the appropriate subsection, such as **Enterprise Class** for the SAN Director 2/128.

   To access 4.x documents (such as this document), select the appropriate product, for example **SAN Director 2/128 & 2/128 Power Pack** or **Core Switch 2/64 & Core Switch 2/64 Power Pack**.

   The switch overview page displays.
5. Go to the **Product information** section, located on the far right side of the web page.
6. Click **Technical documents**.
7. Follow the onscreen instructions to download the applicable documents.

Document conventions and symbols

Table 1 Document conventions

Convention	Element
Medium blue text: Figure 1	Cross-reference links and e-mail addresses
Medium blue, underlined text (http://www.hp.com)	Web site addresses
Bold font	• Key names • Text typed into a GUI element, such as into a box • GUI elements that are clicked or selected, such as menu and list items, buttons, and check boxes
Italics font	Text emphasis
`Monospace` font	• File and directory names • System output • Code • Text typed at the command-line
`Monospace italic` font	• Code variables • Command-line variables
`Monospace, bold font`	Emphasis of file and directory names, system output, code, and text typed at the command-line

WARNING! Indicates that failure to follow directions could result in bodily harm or death.

CAUTION: Indicates that failure to follow directions could result in damage to equipment or data.

IMPORTANT: Provides clarifying information or specific instructions.

NOTE: Provides additional information.

TIP: Provides helpful hints and shortcuts.

HP technical support

Telephone numbers for worldwide technical support are listed on the following HP web site: http://www.hp.com/support/. From this web site, select the country of origin.



NOTE: For continuous quality improvement, calls may be recorded or monitored.

Obtain the following information before calling:

- Technical support registration number (if applicable)
- Product serial numbers
- Product model names and numbers
- Applicable error messages
- Operating system type and revision level
- Detailed, specific questions

HP Storage web site

The HP web site has the latest information on this product, as well as the latest drivers. Access storage at: http://www.hp.com/country/us/eng/prodserv/storage.html. From this web site, select the appropriate product or solution.

HP authorized reseller

For the name of your nearest HP authorized reseller:

- In the United States, call 1-800-345-1518.
- Elsewhere, visit http://www.hp.com and click **Contact HP** to find locations and telephone numbers.

1 Introducing Advanced Web Tools

HP StorageWorks Advanced Web Tools is a GUI that enables administrators to monitor and manage single or small fabrics, switches, and ports from a standard workstation. It is included with every HP StorageWorks B-Series switch.

Web Tools provides the administrative control point for HP Advanced Fabric Services, including Advanced Zoning, ISL Trunking, Advanced Performance Monitoring, and Fabric Watch. Advanced Web Tools also provides an interface to telnet commands to perform special switch functions and diagnostics that are available only through the telnet interface.

This chapter contains the following sections:

- Changes to this guide for OS v5.0.0, page 13
- Launching Advanced Web Tools, page 24
- Switch Explorer, page 25
- Displaying Switches in the fabric, page 32
- Advanced Web Tools and secure mode, page 32
- Recommendations for working with Advanced Web Tools, page 33

Changes to this guide for OS v5.0.0

The following changes are new to v5.0.0 and are not included elsewhere in this guide.

- On page 24, in the section “Launching Advanced Web Tools,” change the following sentence:

  For a list of Web browsers compatible with Fabric OS 4.4.0, refer to “Requirements” on page 23.

  to:

  For a list of Web browsers compatible with Fabric OS 5.0.0, refer to “Requirements” on page 23.

- On page 24, in the section “Launching Advanced Web Tools,” add the following after the first paragraph:

  When you launch Advanced Web Tools, you must log in to establish a session. You can log in at the admin, switchAdmin, or user level. Each role gives you different access levels:

  - admin - You have full access to all of the Web Tools functionality.
  - switchAdmin - You can do everything the admin role can do, except for the following:
    - You cannot modify zoning configurations.
    - You cannot change account information for any accounts other than your own.
  - user - You can view switch information, but cannot access any of the switch administration modules.

- On page 24, in the section “To launch Web Tools,” add the following information after step 2:

  The switch banner displays, if one is configured for the switch.

  3) Optional: Accept the security terms as displayed in the banner.

The login dialog box is displayed.

4) Type the user name of an account and the admin, switchAdmin, or user role.

5) Type the password.

6) Click **OK**.

- On page 1-3:

  After this sentence:

  > The SAN Switch 2/8V Switch Explorer view (shown in Figure 4 on page 29) is a good example showing how the SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 Switch Explorer views look.

  Add this sentence:

  > The Switch Explorer (shown in Figure 4 on page 29) is a good example of how the Brocade 4Gb SAN Switch for HP p-Class BladeSystem Switch Explorer view looks.

- On page 26:

  Replace this paragraph:

  > In Figure 2, the Core Switch 2/64 has two domains; there is a separate set of Switch View buttons for each logical switch. When only one domain exists, there is one shared set of Switch View buttons, as displayed in Figure 3. The active CP in the Core Switch 2/64 is labeled with a small arrow at the bottom of the CP display.

  With the following:

  > In Figure 2, the Core Switch 2/64 director has two domains; however, only one domain is displayed. You can view and manage only one domain at a time, even though both domains are enclosed in the same chassis. To manage the other domain, you must log in to it separately. The active CP in the Core Switch 2/64 director is labeled with a small arrow at the bottom of the CP display.

- On page 16:

  After this sentence:

  > Figure 2 on page 27 shows an example of the Web Tools Switch Explorer for a Core Switch 2/64.

  Add the following:

  > This format is similar to the Switch Explorer format for the Brocade 4Gb SAN Switch for HP p-Class BladeSystem.

- On page 31, in the section “Switch Information View”:

  Replace this sentence:

  > For all other switch types (HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32), the Switch Information View is located beneath the graphic representation of the switch.

With the following:

For all other switch types (HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem), the Switch Information View is located below the graphic representation of the switch.

- On page 32, after the section "Displaying switches in the fabric," add the following section:

Ending the Web Tools session

You can end your Web Tools session by either logging out or closing the Switch Explorer browser window.

A session automatically times out if it has been inactive for longer than 10 minutes. If the session times out, you must restart your browser, access Web Tools, and log in again.

To end the Web Tools session

Click **Logout** in the Switch Explorer.

or

Click the X in the upper right corner of the Switch Explorer browser window to close the window.

- On page 32, in the section "Opening modules in a secure fabric," add the following:

Replace the following sentences:

When opening modules in a secure fabric, log in to one module at a time and complete the entire login process before proceeding to another task. For example, if you want to access both the Zone Admin and the Switch Admin modules, open one of the modules, log in, and wait for it to load completely before opening the second module.

With the following:

When opening modules in a secure fabric, wait for each module to load completely before proceeding to any other task. For example, if you want to access both the Zone Admin and the Switch Admin modules, open one of the modules and wait for it to load completely before opening the second module.

- On page 39, in the section "Switch support," replace the first sentence:

You can use Web Tools 4.x with the following hardware:

With the following:

You can use Web Tools 5.0.0 with the following hardware:

- On page 39, in the section “Switch support,” add the following to the list of switches:
  - Brocade 4Gb SAN Switch for HP p-Class BladeSystem
- On page 42, in the section “Managing fabrics, switches, and ports using Advanced Web Tools,” replace the first two sentences:

  When you click the **Admin** button from the Switch View, you must log in as an admin to launch the Switch Admin module. Information displayed in the Switch Admin module is *not* updated automatically by Advanced Web Tools.

  With the following:

  With the exception of switch time, information displayed in the Switch Admin module is *not* updated automatically by Web Tools.
- On page 43, in the section “Launching the Switch Admin module,” delete the following:

  The login dialog box opens.

  1) Enter the user name of an account with the admin role.

  2) Enter the password.
- On page 47, in the section “Changing the switch name,” replace this sentence:

  Switch names can be a maximum of 15 characters long for Fabric OS 4.x.

  With the following:

  Switch names can be a maximum of 15 characters long for Fabric OS 5.0.0.

- On page 52, replace Figure 10, “Ports tab,” with the following:

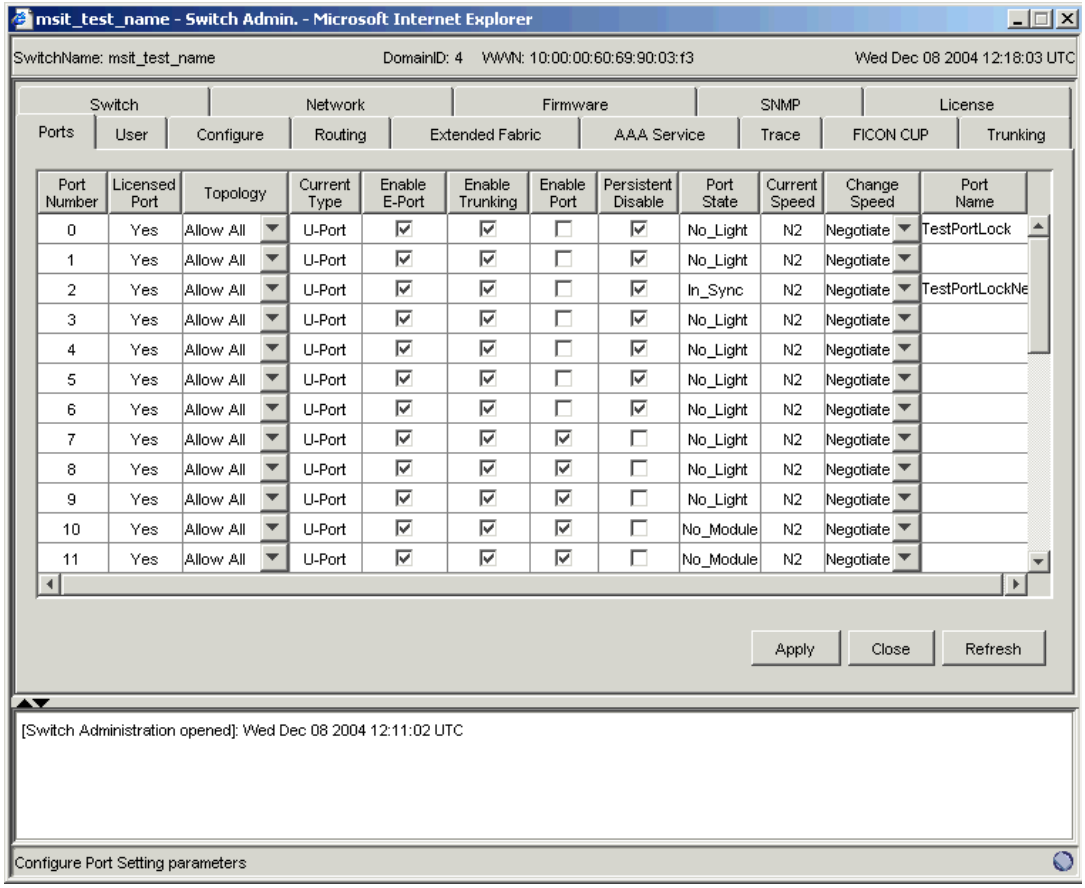


Figure 10 Ports tab

- On page 17, add the following section after Figure 10:

Configuring port type

The Current Type column in the Ports tab indicates the current type of the port. Use the following procedure to change the port type.

To change the port type

1. Launch the Switch Admin module as described on page 43.
2. Click the **Ports** tab and take the action appropriate to your system:
   - For HP StorageWorks Core Switch 2/64 and Core Switch 2/128 directors, select the subtab that corresponds to the correct slot for the logical switch.
   - For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, Brocade 4Gb SAN Switch for HP p-Class BladeSystem, and SAN Switch 4/32 switches, proceed directly to the next step.
3. Click the number of the port you want to change.
4. Select a port type from the corresponding Topology drop-down list.
   - Allow All - allows the port to be of any type (E_Port, F_Port, or FL_Port).
   - Pt-to-Pt[G-Port] - locks the port as a G_Port. The port can be either an E_Port or an F_Port.
   - Loop[L-Port] - locks the port as an L_Port. The port must be an FL_Port.

5. Check the **Enable E-Port** checkbox to allow the port to be an E_Port; however, do not check this option if the topology is Loop[L-Port]. (A port cannot be both an E_Port and an L_Port.)

6. Click **Apply**.

- On page 52, in the section "Configuring port speed," replace this sentence:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 switches, proceed directly to the next step.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32 switches, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, proceed directly to the next step.

- On page 53, in the section, "To name a port," replace this sentence:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 switches, proceed directly to the next step.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32 switches, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, proceed directly to the next step.

- On page 53, in the section, "Disabling a port over reboots", replace this sentence:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 switches, proceed directly to the next step.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, proceed directly to the next step.

- On page 53, in the section, "Enabling and disabling a port," replace this sentence:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 switches, proceed directly to the next step.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, proceed directly to the next step.

- On page 56, replace Figure 11, “Extended Fabric tab,” with the following:

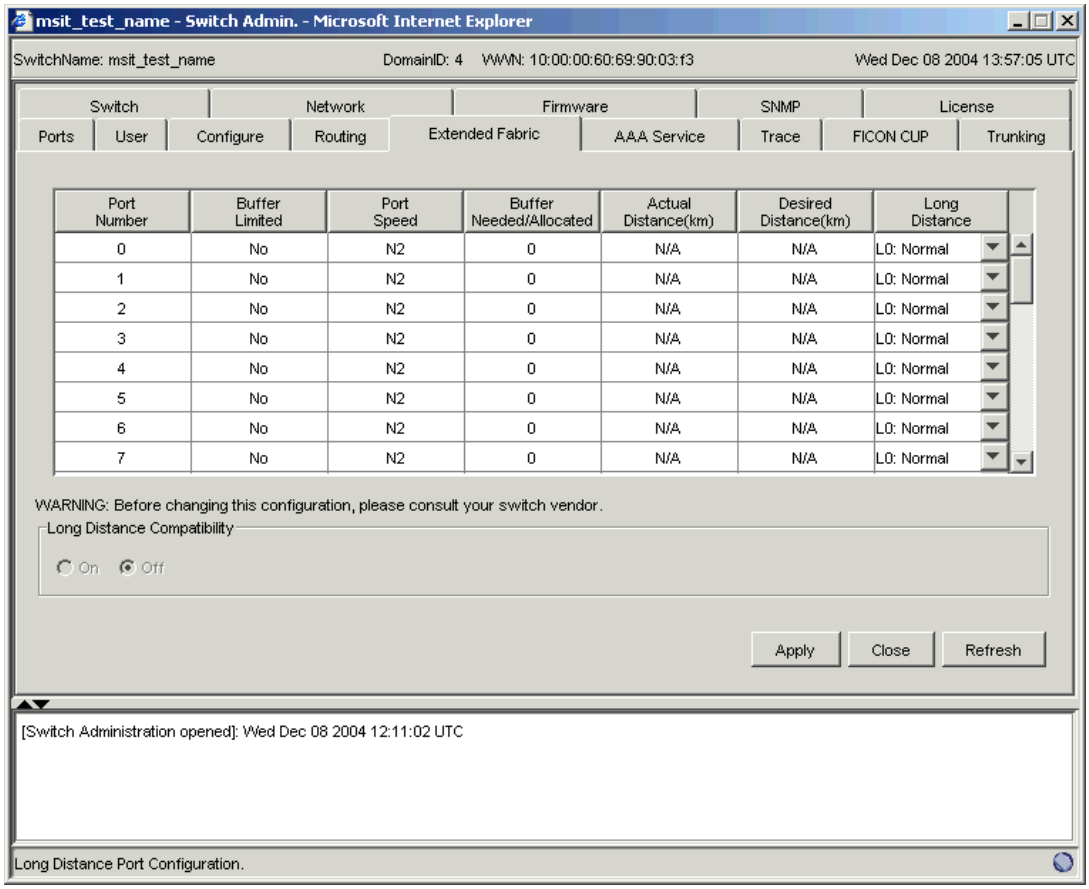


Figure 11 Extended Fabric tab

- On page 56, in the section, “To configure a port for long-distance connection,” replace this sentence:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 switches, proceed directly to the next step.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, proceed directly to the next step.

- On page 57, in the section “Configuring routes,” replace this paragraph:

  Routing policies are configured from the CLI. For Fabric OS 4.x, the supported routing policies are:

  - port-based
  - device-based (SAN Switch 4/32 only)
  - exchanged-based (SAN Switch 4/32 only)

  For the SAN Switch 4/32 only, the exchange-based routing policy is the default.

  With the following:

  Routing policies are configured from the CLI. For Fabric OS 5.0.x, the supported routing policies are:

  - port-based

- device-based (SAN Switch 4/32 and Brocade 4Gb SAN Switch for HP p-Class BladeSystem only)
- exchanged-based (SAN Switch 4/32 and Brocade 4Gb SAN Switch for HP p-Class BladeSystem only)

For the SAN Switch 4/32 and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, the exchange-based routing policy is the default.

- On page 58, in the section "To view FSPF routing," replace this sentence:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, click the FSPF Route category in the navigation tree.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, click the FSPF Route category in the navigation tree.

- On page 59, in the section "To configure a static route," replace this sentence:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 switches, click the Static Route category in the navigation tree and then click **Add**.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, click the Static Route category in the navigation tree and then click **Add**.

- On page 60, in the section "To configure the link cost for a port," replace this sentence:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 switches, select **Link Cost** in the navigation tree.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, select **Link Cost** in the navigation tree.

- On page 65, in the section "To disable or reenable trunking mode on a port," replace this sentence:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, proceed directly to the next step.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32 and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, proceed directly to the next step.

- On page 69, in the section "Creating and Maintaining User-Defined Accounts," replace the first sentence:

  In addition to the four default accounts—root, factory, admin, and user—Fabric OS supports up to 15 user-defined accounts in each logical switch (domain).

  With the following:

  In addition to the five default accounts—root, factory, admin, switchAdmin, and user—Fabric OS supports up to 15 user-defined accounts in each logical switch (domain).

- On page 69, in the section "Creating and Maintaining User-Defined Accounts," replace the second paragraph:

The User tab of the Switch Admin module (see Figure 17) displays account information and enables you to create and manage user accounts.

With the following:

If you are logged in as an admin, the User tab of the Switch Admin module (see Figure 17) displays account information and enables you to create and manage user accounts. If you are logged in as a switchAdmin, you can change your own password but cannot view or modify other accounts. If you are logged in as a user role, you cannot access the Switch Admin module.

- On page 69, in the section "To display account information," after this sentence:

  A list of the default and user-defined accounts opens.

  Add the following:

  If you are logged in using the switchAdmin role, only your account information is displayed.

- On page 69, in the section "To create a user-defined account," replace step 5:

  Select a role from the list: either admin or user in nonsecure mode; admin, user, or nonfcsadmin in secure mode.

  With the following:

  Select a role from the list: either admin, switchAdmin, or user in nonsecure mode; admin, switchAdmin, user, or nonfcsadmin in secure mode.

- On page 70, in the section "To change account parameters," replace step 5:

  Select a role from the list: either admin or user in nonsecure mode; admin, user, or nonfcsadmin in secure mode.

  With the following:

  Select a role from the list: admin, switchAdmin, or user in nonsecure mode; admin, switchAdmin, user, or nonfcsadmin in secure mode.

- On page 71, in the section "To change the password for an admin or user level account," change the name of the section, to the following:

  "To change the password of an account"

- On page 71, in the section "To change the password for an admin or user level account," replace step 3:

  3) Select the account to modify.

  You can change the password of your own account, peer admin accounts, and user accounts. You cannot change the root or factory account passwords.

  With the following:

  3) Select the account to modify.

  If you are logged in as admin, you can change the password of your own account, peer admin accounts, switchAdmin accounts, and user accounts. You cannot change the root or factory account passwords.

  If you are logged in as a switchAdmin, you can only change the password of your own account.

- On page 73, in the "To launch the Hi Avail module" section, delete the following:

  The login dialog box is displayed.

3) Enter the user name of an account with the admin role.

4) Enter the password.

- On page 90, in the "Displaying port information" section, in the last paragraph, replace this sentence:

  For the HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, there are no subtabs for the slots, there are no subtabs for the slots.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, there are no subtabs for the slots.

- On page 91, in the section "To access the Port Information screen," replace this sentence:

  For the HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, and SAN Switch 4/32 switches, proceed directly to the next step.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, proceed directly to the next step.

- On page 93, in the section "Managing zoning with Advanced Web Tools," delete the following sentence:

  When you click the Zone Admin icon from the Fabric Toolbar, you must log in as an admin user to launch the Zone Admin module.

  And replace it with the following paragraph:

  You must be logged in as an admin or switchAdmin to launch the Zone Admin module. If you are logged in as a switchAdmin, you can access the Zone Admin module in read-only mode only; most of the zoning operations are disabled in read-only mode.

- On page 95, in the section "Launching the Zone Administration module," delete the following:

  The login dialog box opens.

  3) Enter the user name of an account with the admin role.

  4) Enter the password.

- On page 101, in the section "Managing QuickLoops," replace this paragraph:

  QuickLoop can be administered using Fabric OS 4.x versions; however, switches or directors running Fabric OS v4.x cannot be members of a QuickLoop. HP StorageWorks Core Switch 2/64, SAN Director 2/128, SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 cannot be members of a QuickLoop.

  With the following:

  QuickLoop can be administered using Fabric OS 5.x versions; however, switches or directors running Fabric OS v5.x cannot be members of a QuickLoop. HP StorageWorks Core Switch 2/64, SAN Director 2/128, SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem cannot be members of a QuickLoop.

- On page 102, in the section "Managing Fabric Assist Zones," replace this paragraph:

  FA zones can be administered using Fabric OS 4.x; however, switches or directors running Fabric OS v4.x cannot be members of a Fabric Assist zone. HP StorageWorks Core Switch 2/64, SAN

Director 2/128, SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 cannot be members of an FA zone.

With the following:

FA zones can be administered using Fabric OS 5.x; however, switches or directors running Fabric OS v5.x cannot be members of a Fabric Assist zone. HP StorageWorks Core Switch 2/64, SAN Director 2/128, SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem cannot be members of a FA zone.

- On page 119, replace this sentence:

  For the SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, slot numbers are not identified.

  With the following:

  For the SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, slot numbers are not identified.

- On page 121 in the section "To create a basic performance monitor graph," replace this sentence:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, you need only type a port number.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, you need type only a port number.

- On page 121, in the section "To customize basic Performance Monitoring graphs," replace this sentence:

  For the HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, proceed to step 3.

  With the following:

  For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, proceed to step 3.

- On page 125, in step 5, replace this sentence:

  For the SAN Switch 4/32, you can enter up to eight LUN masks.

  With the following:

  For the SAN Switch 4/32 and Brocade 4Gb SAN Switch for HP p-Class BladeSystem, you can enter up to eight LUN masks.

- On page 125, in the section "Creating an AL_PA error graph," replace this sentence:

  The AL_PA Error graph is not supported on the SAN Switch 4/32.

  With the following:

  The AL_PA Error graph is not supported on the SAN Switch 4/32 or on the Brocade 4Gb SAN Switch for HP p-Class BladeSystem.

- On page 130, in the section "To launch the Fabric Watch module," delete the following:

  The login dialog box opens.

  3) Enter the user name of an account with the admin role.

4) Enter the password.

- On page 129, in Table 11, "Firmware Download" row, replace this sentence:

  SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 switches: loss of network connectivity is up to 1 minute if POST is disabled.

  With the following:

  SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32, and Brocade 4Gb SAN Switch for HP p-Class BladeSystem: loss of network connectivity is up to 1 minute if POST is disabled.

- On page 132, in Figure 11, "Windows Operating Systems" row, replace this sentence:

  You might still be able to invoke various features from Switch View, such as Status, Info, Fan Temp, Power, and Beacon.

  With the following:

  You might still be able to invoke various features from Switch View, such as Status, Fan Temp, Power, and Beacon.

Launching Advanced Web Tools

You can launch Advanced Web Tools on any workstation that has a compatible web browser installed. For a list of web browsers compatible with Fabric OS v4.x, see "Requirements" on page 35. Advanced Web Tools also supports HTTPS protocol, if that protocol is enabled for the switch. For more information on enabling the HTTPS protocol on your switch, refer to the *HP StorageWorks Fabric OS 4.x procedures user guide*.

To launch Advanced Web Tools:

1. Launch the web browser and enter the IP address of the licensed switch in the Location/Address field:

   ```
   http://123.123.123.123
   ```

   or

   ```
   https://123.123.123.123
   ```

2. Press **Enter**.

   Advanced Web Tools launches as shown in Figure 1.

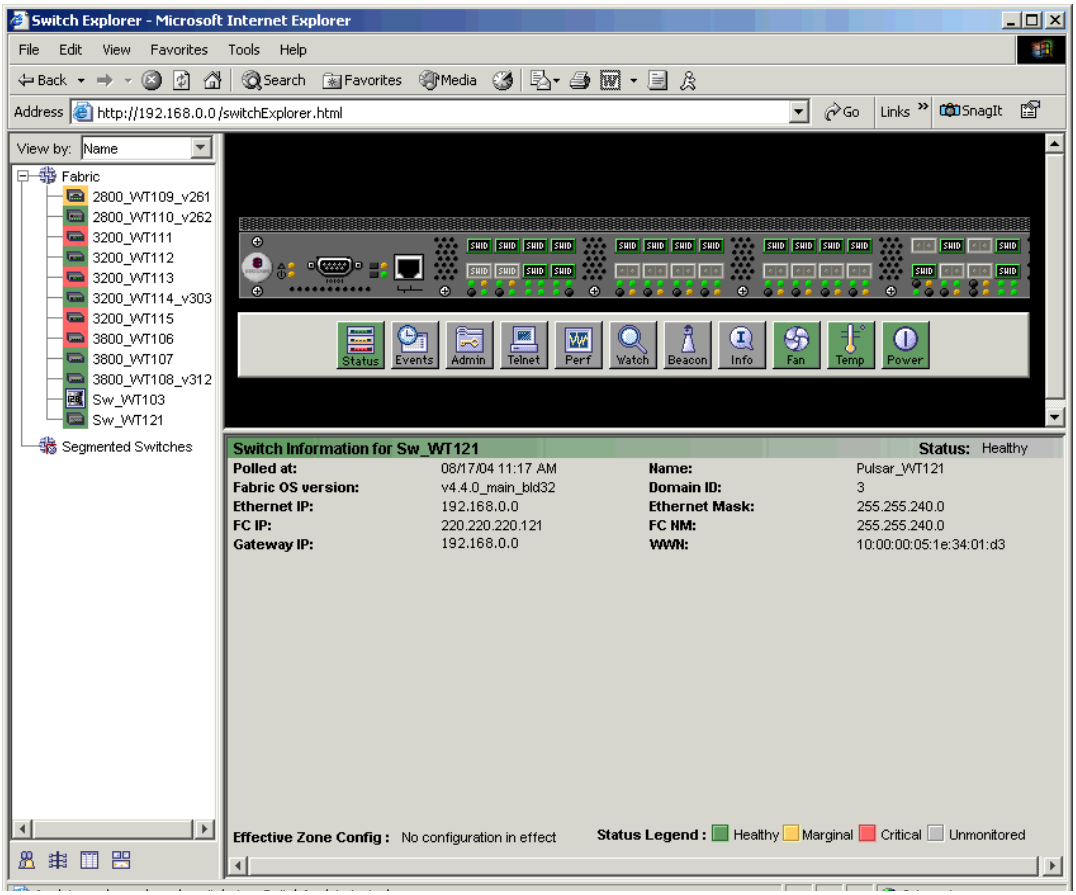


Figure 1 Advanced Web Tools Switch Explorer for a SAN Switch 4/32

Switch Explorer

The first thing you see when you log in to a switch with Advanced Web Tools is the Switch Explorer (Figure 1). The Switch Explorer is divided into areas that provide access to and information about the switch and fabric. Familiarize yourself with these areas; the procedures in this guide refer to them as follows:

- Fabric Tree, which displays a list of all the switches in the fabric
- Fabric Toolbar, which provides access to fabric-wide management interfaces, such as Name Server, and events
- Switch View, which displays an interactive graphical representation of the switch
- Switch View button menu, which displays buttons providing switch information, such as status, event information, access to telnet, switch administration, switch performance, beaconing, and more
- Switch Information View, which displays information about the switch such as name, status, Fabric OS version, domain ID, IP address, and worldwide name (WWN)
- Status Legend, which defines the meaning of the colors visible in the background of various icons in the Switch Explorer

These areas are described in greater detail in the sections that follow.

Clicking some of the buttons and icons in the Switch Explorer opens a separate module from which you can perform management tasks. In this document, a *module* is a collection of related tabs or *views* that appears in a single browser window.

The format of the Switch Explorer varies depending on the hardware type. Figure 2 on page 27 through Figure 4 on page 29 show Switch Explorer examples for several HP StorageWorks switches. The SAN Switch 2/8V Switch Explorer view (shown in Figure 4 on page 29) is a good example showing how the SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 Switch Explorer views look. Note that these figures are grayed out so that you can more easily see the areas of the Switch Explorer.

In Figure 2 through Figure 4, the letters A through F call out the various areas within the Switch Explorer. Table 2 is a key for these callouts.

Table 2 Key to Figure 2 through Figure 4

Callout letter	Area of Switch Explorer View
A	Fabric Tree
B	Fabric Toolbar
C	Switch View
D	Switch View button menu
E	Switch Information View
F	Status Legend

Figure 2 shows an example of the Advanced Web Tools Switch Explorer for a Core Switch 2/64.

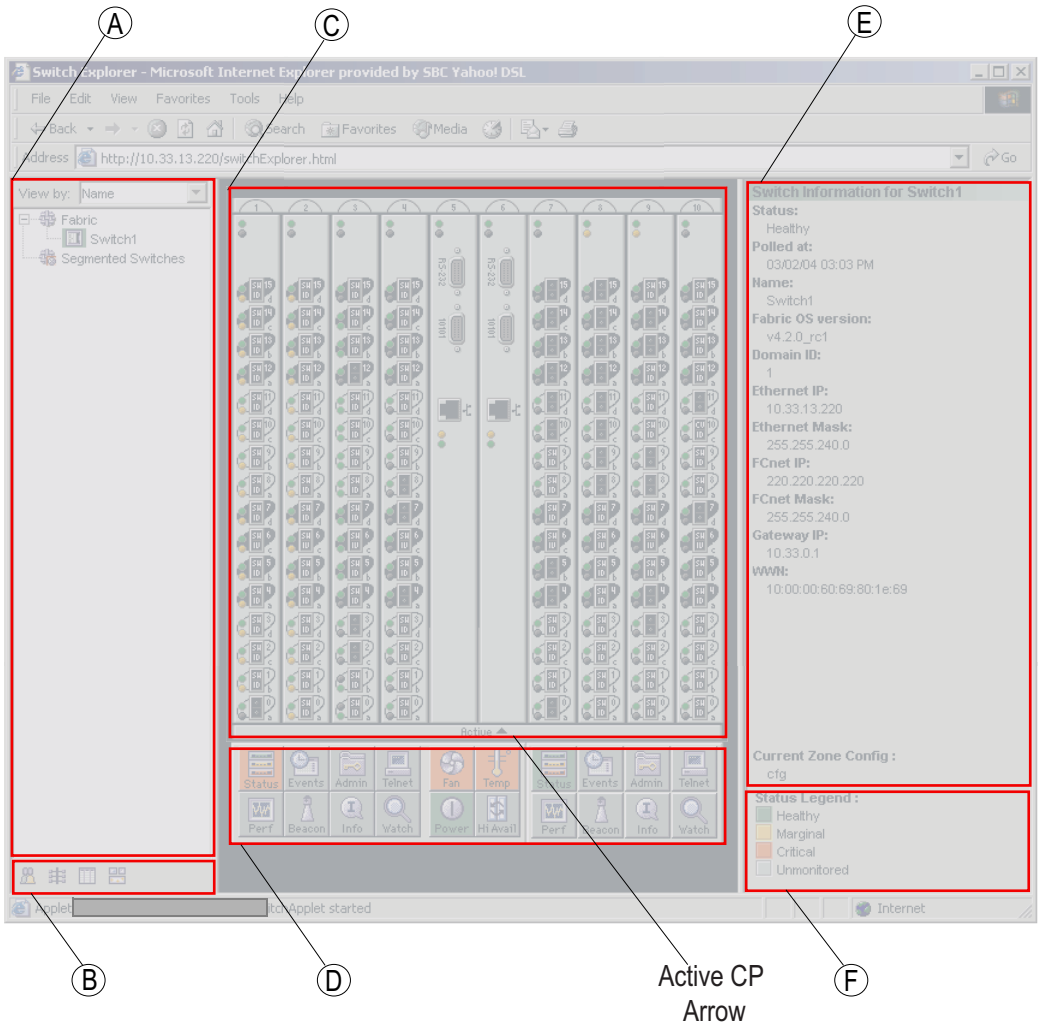


Figure 2 Advanced Web Tools Switch Explorer for a Core Switch 2/64

In Figure 2, the Core Switch 2/64 has two domains; there is a separate set of Switch View buttons for each logical switch. When only one domain exists, there is one shared set of Switch View buttons, as displayed in Figure 3. The active CP in the Core Switch 2/64 is labeled with a small arrow at the bottom of the CP display.

Figure 3 shows an example of the Advanced Web Tools Switch Explorer for a SAN Director 2/128 at the bottom of the CP display.

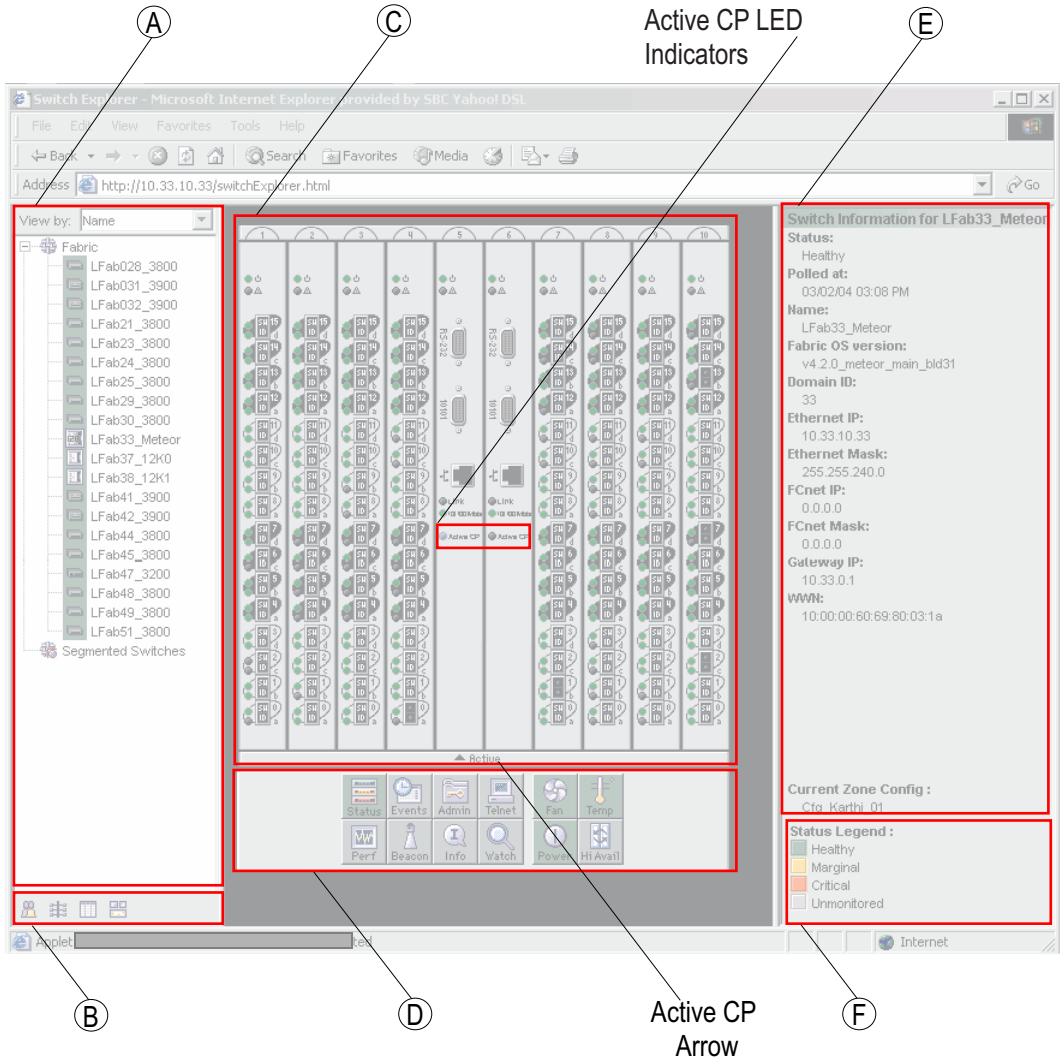


Figure 3 Advanced Web Tools Switch Explorer for a SAN Director 2/128

The active CP in the SAN Director 2/128 is labeled with a small arrow at the bottom of the CP display. The SAN Director 2/128 active CP is also indicated with the blue Active CP LED indicator, as shown in Figure 3.

Figure 4 is an example of the Advanced Web Tools Switch Explorer for a SAN Switch 2/8V. This is the same format of the Switch Explorer used in Advanced Web Tools for the SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32.

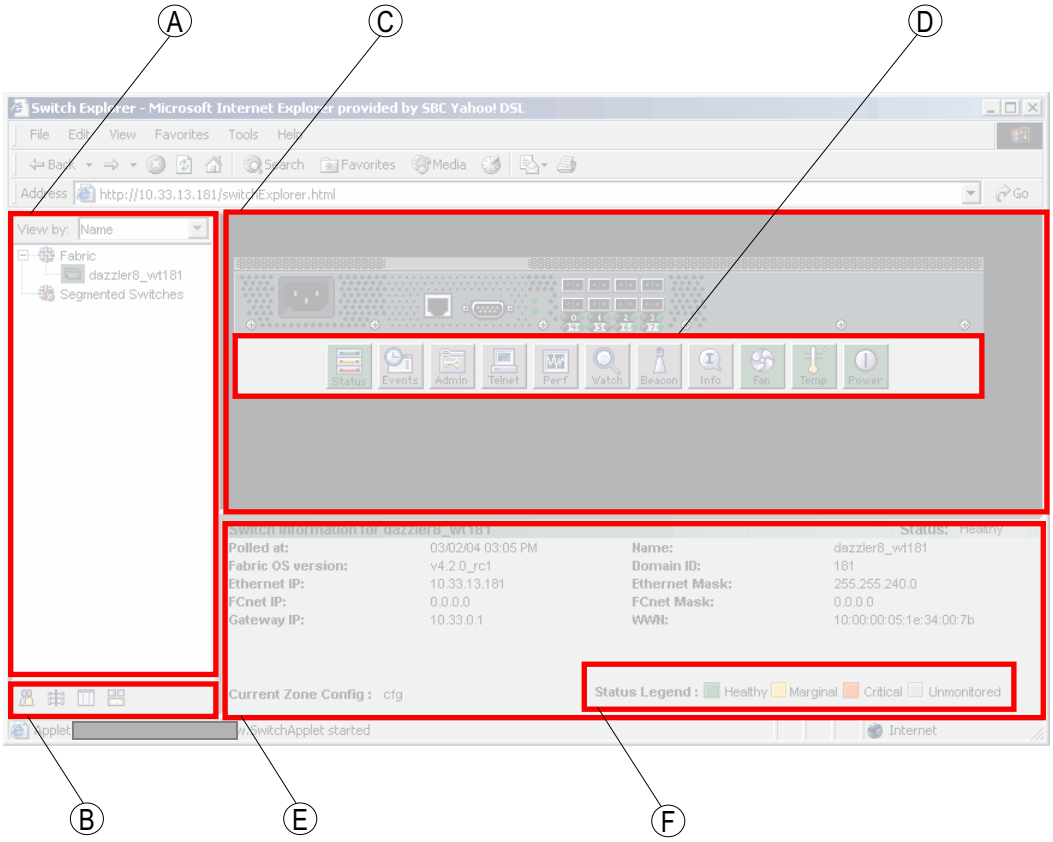


Figure 4 Advanced Web Tools Switch Explorer for a SAN Switch 2/8V

Different areas of the Switch Explorer refresh at different rates. Table 3 lists the polling rates for the various panels in Advanced Web Tools.

Table 3 Polling rate in the Switch Explorer window

Switch Explorer area	Polling rate
Name Server	User-defined; 15 seconds minimum
Zoning Database	60 seconds
Fabric Watch	15 seconds
Performance Monitor	30 seconds

Fabric Tree

The Fabric Tree is the left panel of the Switch Explorer. The Fabric Tree displays all switches in the fabric, including switches that do not have an Advanced Web Tools license. Switches segmented before Advanced Web Tools is launched are not displayed.

Although all switches in the fabric are *displayed*, only switches that have an Advanced Web Tools license installed can be *managed* through Advanced Web Tools. Other switches must be managed through the Fabric OS command line interface (CLI) or another management application. For information on adding an Advanced Web Tools license to a switch, see "Installing an Advanced Web Tools license" on page 37.

Use the menu at the top of the panel to view switches in the Fabric Tree by switch name, IP address, or WWN. The background color of the switch icon indicates the current status of the switch.

The Fabric Tree is updated at time intervals, depending on the number of switches in the fabric. On average, for a fabric with up to 12 switches, the Fabric Tree is updated every 30 seconds. For every additional 12 switches in the fabric, an additional 30 seconds are required to update the Fabric Tree. The Switch Information View displays a field, Polled At, that identifies the last time the information was updated.

You can also manually refresh the status of a switch within the fabric by right-clicking that switch in the Fabric Tree and then selecting **Refresh**.

Fabric Toolbar

The Fabric Toolbar at the bottom of the Fabric Tree enables you to access fabric-wide administration tasks quickly. The Fabric Toolbar icons provide access to:



- **Fabric events:** information collected from the launch switch. See "Monitoring events" on page 79 for more information.



- **Topology module:** information collected from the selected switch. See "Displaying a fabric topology report" on page 84 for more information.



- **Name Server information:** information collected from the selected switch. See "Displaying the name server entries" on page 85 for more information.



- **Zone Administration module:** information collected from the selected switch. This icon is displayed only if an HP Advanced Zoning license is installed on the switch. If secure mode is enabled, zoning can be administered only from the primary FCS switch. If the selected switch has a zoning license installed but is not the primary switch, the Zone Admin icon is displayed but not activated. See "Managing zoning with Advanced Web Tools" on page 93 for more information.

It is important to note that the information displayed is gathered from different areas; switches in the fabric may run different versions of Fabric OS, and different versions of Fabric OS support different features, so the information displayed may not always be the same for switches running different versions of Fabric OS.

Switch View

The Switch View displays a graphical representation of the selected switch, including a real-time view of switch and port status. This view is accessed by selecting a switch icon in the Fabric Tree.



NOTE: The Switch View display is updated approximately every 15 seconds. The initial display of the Switch Explorer, however, may take from 30 to 60 seconds after the switch is booted.

The layout of information is different for the Switch View of different switch types. See Figure 2 through Figure 4 for examples of different Switch Views.

Switch View button menu

The Switch View button menu is the launch point for the Switch Events screen, telnet interface, Fabric Watch module, Switch Admin module, Performance Monitor module, and High Availability (HA) Admin module. Some of these functions require a license key to activate. The Switch View button menu also includes buttons that display the status of the switch fans, temperature monitors, switch information, power supply, and beacon.

It is important to note that certain Fabric OS features are available only on particular switch types; therefore, the icons for those features are displayed only for those switch types. For example, the High Availability feature is available only on the Core Switch 2/64 and SAN Director 2/128. Thus, the HA Admin button is displayed in the Switch View button menu only for these switches.

The following buttons have a color-coded background, which indicates status for that area:

- Status
- Fan
- Temp
- Power
- Hi Avail (HA)

The colors follow the status legend (see "Status Legend" on page 31).

Switch Information View

The Switch Information View displays vital switch information, such as name, status, Fabric OS version, domain ID, IP address, WWN, and current zone configuration.

The Switch Information View is located next to the graphic representation of the switch for the Core Switch 2/64 and the SAN Director 2/128. For all other switch types (HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32), the Switch Information View is located beneath the graphic representation of the switch.



NOTE: The information in the Switch Information View is polled every 15 seconds.

For more information, see "Displaying detailed switch information" on page 90.

Status Legend

The Status Legend is included in the Switch Information View and defines the meaning of colors visible in the background of the various icons in the Switch Explorer.

Each color indicates a different operational state:

- Green for healthy
- Yellow for marginal
- Red for critical
- Gray for unknown or unmonitored



NOTE: For all status displays based on an errors-per-time-interval, any errors cause the status to show faulty until the entire sample interval has passed.

Displaying Switches in the fabric

If your fabric has more than one switch, you can launch Advanced Web Tools from one switch and then access other switches.

To access the Switch Explorer for a particular switch:

1. Launch Advanced Web Tools (see "Launching Advanced Web Tools" on page 24).

   The Switch Explorer is displayed for the switch you logged in to. The Fabric Tree is expanded by default when you first launch Advanced Web Tools.

2. If the Fabric Tree is not expanded, click the + sign in the Fabric Tree to view all the switches in the fabric.
3. Click a switch in the Fabric Tree.

   The graphic of the selected switch is displayed in the Switch View. Additional switch information is displayed in the Switch Information View.

Advanced Web Tools and secure mode

When secure mode is enabled on switches managed through Advanced Web Tools, there are certain requirements and scenarios to keep in mind. Read through the requirements and scenarios in this section if you plan to use Advanced Web Tools to manage any switches that have secure mode enabled.

Advanced Web Tools access and HTTP_POLICY

When secure mode is enabled, access to the Advanced Web Tools interface is controlled by HTTP_POLICY. If secure mode is enabled and HTTP_POLICY has been defined, your workstation IP address must be included in this policy or you will not have access to Advanced Web Tools for any switch in the fabric. If your workstation IP is not included in this policy, the Interface Disabled page is displayed when you attempt to access a switch. For instructions on including your workstation in HTTP_POLICY, refer to the *HP StorageWorks Secure Fabric OS user guide*.



NOTE: If a secure mode change is made in the fabric—that is, secure mode is enabled, secure mode is disabled, or there is a change to the primary FCS—you must exit and relaunch Advanced Web Tools. If Advanced Web Tools is kept open after a secure mode change occurs, behavior is undefined.

Opening modules in a secure fabric

When opening modules in a secure fabric, log in to one module at a time and complete the entire login process before proceeding to another task. For example, if you want to access both the Zone Admin and the Switch Admin modules, open one of the modules, log in, and wait for it to load completely before opening the second module. Abnormal behavior can occur if you attempt to open two modules simultaneously in a fabric with secure mode enabled.

Certain Advanced Web Tools features are limited or disabled when secure mode is enabled on a fabric. For more information about secure mode, refer to the *HP StorageWorks Secure Fabric OS user guide*.

Primary-FCS-only functionality

The following Advanced Web Tools functionality is reserved for the primary FCS when secure mode is enabled:

- Zoning administration is allowed only from the primary FCS switch when secure mode is enabled. For all other switches in a secure fabric, the Zoning button is disabled.
- SNMP community strings can be modified only from the primary FCS switch when secure mode is enabled. For non-FCS switches, you can view the SNMP community strings, but they are read-only, and the SNMP access control lists on the SNMP tab are not displayed.
- User account administration is allowed only from the primary FCS switch when secure mode is enabled. The changes are then propagated to all switches in the fabric.

Disabled functionality

Telnet access to a switch and the Telnet button in Advanced Web Tools are both disabled when secure mode is enabled for a fabric. You must use sectelnet or SSH to access the Fabric OS CLI in a secure fabric. These capabilities are not accessible from Advanced Web Tools. For more information on sectelnet or SSH, refer to the *HP StorageWorks Secure Fabric OS user guide*.

The SNMP Access Control List is replaced with RSNMP_POLICY and WSNMP_POLICY when secure mode is enabled for a fabric. The SNMP Access Control List is not displayed in Advanced Web Tools.

Recommendations for working with Advanced Web Tools

Consider the following when working with Advanced Web Tools:

- When using a mixed fabric—that is, a fabric containing switches and directors running v4.x, v3.x, and v2.x firmware—use the most advanced switches or directors to control the fabric. For example, use the v4.x switches or directors as the primary FCS, the location to perform zoning tasks, and the time server (CLI). You should use the most recently released firmware on your switches.
- If switches are accessed simultaneously from different connections (for example, Advanced Web Tools, CLI, and API), changes from one connection may not be updated on the other, and some modifications may be lost. Make sure when connecting with simultaneous multiple connections that you do not overwrite the work of another connection.
- Several tasks in Advanced Web Tools make fabric-level changes: for example, the tasks in the Zone Admin module. When executing fabric-level configuration tasks, wait until you have received confirmation that the changes are implemented before executing any subsequent tasks. For a large fabric, this can take a few minutes.
- Many of the Switch View windows are automatically closed when you select a different switch in the Fabric Tree. This is normal behavior and is designed to prevent configuration changes from being performed on the wrong switch.
- HP recommends no more than five simultaneous HTTP sessions to any one switch. An HTTP session is considered a Fabric Manager or Advanced Web Tools connection to the switch.

2 Requirements, installation, and support

Before you install Advanced Web Tools on your workstation, verify that your switches and workstation meet the Advanced Web Tools requirements specified in this chapter, which contains the following sections:

- Requirements, page 35
- Installing an Advanced Web Tools license, page 37
- Value line licenses, page 39
- Switch support, page 39

Requirements

Advanced Web Tools requires any browser that conforms to HTML version 4.0, JavaScript version 1.0, and Java™ Plug-in 1.4.2_03 or later.

HP has certified and tested Advanced Web Tools on the platforms shown in Table 4.

Table 4 Certified and tested platforms

Operating system	Browser	Java Plug-in
Solaris 2.8	Mozilla 1.6	1.4.2_03
Solaris 2.9	Mozilla 1.6	1.4.2_03
Windows® 2000	Internet Explorer 6.0	1.4.2_03
Windows 2003	Internet Explorer 6.0	1.4.2_03
Windows XP®	Internet Explorer 6.0	1.4.2_03

HP has also tested Advanced Web Tools on the platform shown in Table 5.

Table 5 Tested platforms

Operating system	Browser	Java Plug-in
Red Hat Linux® 9.0	Mozilla 1.6	1.4.2_03

NOTE: Some browsers must be configured to work with Advanced Web Tools. For information about how to do this, see "Configuring Internet Explorer" on page 36.

Adequate RAM is required on Windows systems as follows:

- 256 MB or more RAM for fabrics comprising 15 switches or fewer
- 512 MB or more RAM for fabrics comprising more than 15 switches

HP also recommends a minimum of 8 MB of video RAM.

Configuring Internet Explorer

Correct operation of Advanced Web Tools with Internet Explorer requires specifying the appropriate settings for browser refresh frequency and process model. Browser pages should be refreshed frequently to ensure the correct operation of Advanced Web Tools.

To set the refresh frequency:

1. Select **Tools > Internet Options** in the browser.
2. Click the **General** tab and then click **Settings** (under Temporary Internet Files).
3. Select **Every visit to the page** under Check for newer versions of stored pages, as shown in Figure 5.

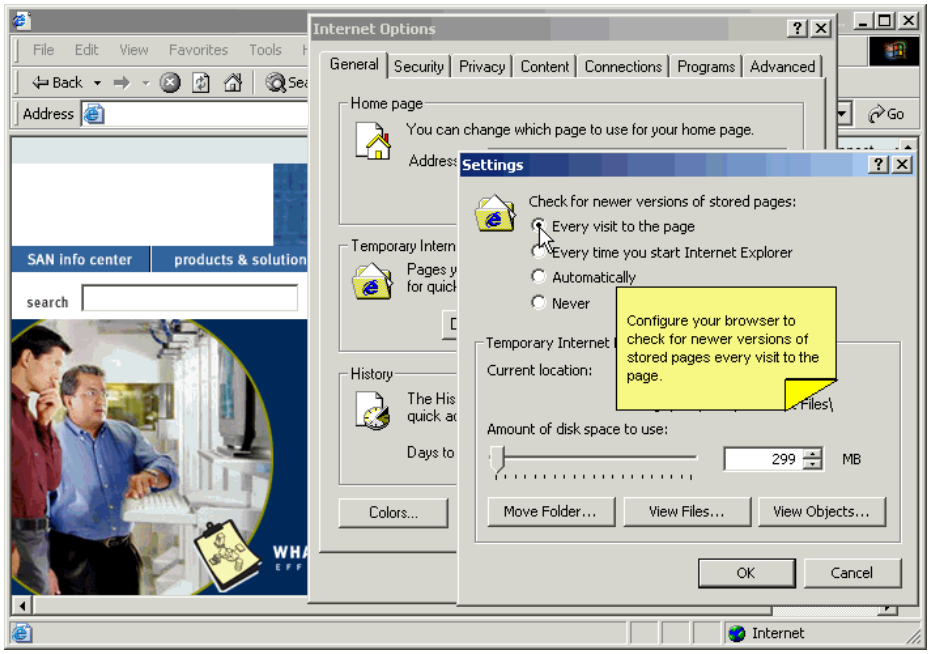


Figure 5 Configuring Internet Explorer

Installing Java on the workstation

A Java Plug-in must be installed on the workstation for the correct operation of Advanced Web Tools. The required version depends on the operating system. See "Requirements" on page 35 for a list of tested browsers on supported operating systems and the Java runtime environment (JRE) they require.

To install the JRE on your Solaris or Linux client workstation:

1. Locate the JRE on the Internet at the following URL:

   ```
   http://java.sun.com/
   ```



NOTE: This URL is subject to change without notice.

2. Follow the instructions to install the JRE.

3. Create a symbolic link from this location:

   $MOZILLA/plugins/libjavaplugin_oji.so

   to this location:

   ```
   $JRE/plugin/$ARCH/ns600/libjavaplugin_oji.so
   ```

To install patches on Solaris:

1. Search for any required patches for your current version of the JRE at the following Web site:

   ```
   http://java.sun.com/j2se/1.4.2/install_solaris.html
   ```

NOTE: This URL is subject to change without notice.

2. Follow the link to download the patch; exit the browser when done.
3. Install the patch and reboot the system.

To install the Java Plug-in on Windows:

1. Select **Start Menu > Settings > Control Panel** and select the Java Plug-in Control Panel.
2. Click the **About** tab.
3. Determine whether the correct Java Plug-in version is installed:
   - If the correct version is installed, Advanced Web Tools is ready to use.
   - If no Java Plug-in is installed, point the browser toward a switch running Fabric OS v4.x, follow the link to the Sun Microsystems web site, download the correct Java Plug-in, and double-click the downloaded file to install the plug-in.
   - If an outdated version is currently installed, uninstall it, relaunch the browser, and enter the address of a switch running Fabric OS v4.4.x or later. Advanced Web Tools guides you through the steps to download the proper Java Plug-in.

Installing an Advanced Web Tools license

You can install an Advanced Web Tools license either through telnet or over the Web.

All licenses, including Advanced Web Tools licenses, are installed on a chassis basis. For example, if you install an Advanced Web Tools license on logical switch 0 in a Core Switch 2/64, you do not need to install an additional Advanced Web Tools license on logical switch 1 of that Core Switch 2/64.

To determine whether a license is already installed on a switch, follow the instructions provided under "Installing an Advanced Web Tools license through telnet" next. If a license is not installed, contact your switch supplier to obtain a license key.

Installing an Advanced Web Tools license through telnet

Use the following procedure to determine whether an Advanced Web Tools license is installed on your switch and, if not, to install an Advanced Web Tools license through telnet:

1. Log in to the switch via telnet (refer to the *HP StorageWorks Fabric OS 4.x procedures user guide* for more information), using an account that has administrative privileges.
2. To determine whether an Advanced Web Tools license is already installed on the switch, enter `licenseshow` on the telnet command line.

A list is displayed, showing all the licenses currently installed on the switch:

```
switch:admin> licenseshow
1A1AaAaaaAAAA1a: ]-- This is the license key. The installed feature is listed
below.
    Zoning license
1A2AaAbbbBBBA1a:
    SES license
1A3AaAbcbBBCC1d:
    QuickLoop license
```

If the Advanced Web Tools license is not included in the list or is incorrect, continue with step 3.

3. On the command line, issue the following command:

   `licenseadd key`

   where *key* is the license key. The license key value is case-sensitive and must be entered exactly as given.

4. Verify that the license was added by issuing the following command:

   `licenseshow`

   If the Advanced Web Tools license is listed, the feature is available. If the license is not listed, repeat step 3.

Installing an Advanced Web Tools license through the Web

Launching Advanced Web Tools from any nonlicensed switch automatically displays the license dialog box. If the fabric already contains at least one licensed switch, you can use Advanced Web Tools to view and license other switches from the licensed switch.

To install the first license through the Web:

1. Launch the web browser and enter the IP address of the switch in the Location/Address field:

   `http://123.123.123.123`

2. Press **Enter**.

   If an Advanced Web Tools license is already installed on the switch, Advanced Web Tools launches. If no license is installed, a license dialog box opens.

3. If the license dialog box opens, follow the instructions provided.

To install additional licenses through the Web:

1. Launch the web browser and enter the IP address of the licensed switch in the Location/Address field:

   `http://123.123.123.123`

2. Press **Enter**.

   Advanced Web Tools opens, displaying the Switch Explorer.

3. Click the icon for the switch to which you want to add a license.

   A licensing window opens.

4. Follow the instructions provided.

Value line licenses

If your fabric includes a switch with a limited switch license and you are launching Advanced Web Tools using that switch and if the fabric exceeds the switch limit indicated in the license, Advanced Web Tools allows a 45-day grace period in which you can still monitor the switch through Advanced Web Tools. However, Advanced Web Tools then displays periodic warning messages.

These messages inform you that your fabric size exceeds the supported switch configuration limit and tells you how long you have before Advanced Web Tools will be disabled. After the 45-day grace period, you will no longer be able to launch Advanced Web Tools from the switch with the limited switch license, if that switch is still exceeding the switch limit.

Switch support

You can use Advanced Web Tools v4.x with the following hardware:

- HP StorageWorks SAN Switch 2/8V
- HP StorageWorks SAN Switch 2/16N
- HP StorageWorks SAN Switch 2/16V
- HP StorageWorks SAN Switch 2/32
- HP StorageWorks SAN Switch 4/32
- HP StorageWorks Core Switch 2/64
- HP StorageWorks SAN Director 2/128

Advanced Web Tools is part of the Fabric OS of a switch. When you launch Advanced Web Tools on a switch, you can manage other switches in the fabric that have earlier or later firmware versions. It is important to note that when accessing these switches, you are opening the remote switch's version of Advanced Web Tools, and the functionality available for those switches may vary.

3 Managing your fabrics, switches, and ports

This chapter contains the following sections:

- Managing fabrics, switches, and ports using Advanced Web Tools, page 42
- Launching the Telnet window, page 43
- Configuring IP and netmask information, page 44
- Configuring a syslog IP address, page 45
- Performing a firmware download, page 45
- Configuring a switch, page 46
- Rebooting the switch, page 48
- Configuring fabric parameters, page 48
- Configuring FAN frame notification parameters, page 51
- Configuring ports, page 52
- Activating ports on demand, page 54
- Configuring a port for long distance, page 55
- Configuring routes, page 57
- Maintaining configurations, page 61
- Maintaining licensed features, page 62
- Administering ISL trunking, page 64
- Managing trace dumps, page 66
- Creating and maintaining user-defined accounts, page 69
- Configuring SNMP information, page 71
- Administering high availability, page 73
- Managing a RADIUS server, page 75

Managing fabrics, switches, and ports using Advanced Web Tools

You can perform most of management tasks described in this chapter through the Switch Admin module. Information in the Switch Admin module is retrieved from the selected switch.

Click the **Admin** button in the Switch View to access the Switch Admin module. Figure 6 shows the Switch Admin module.

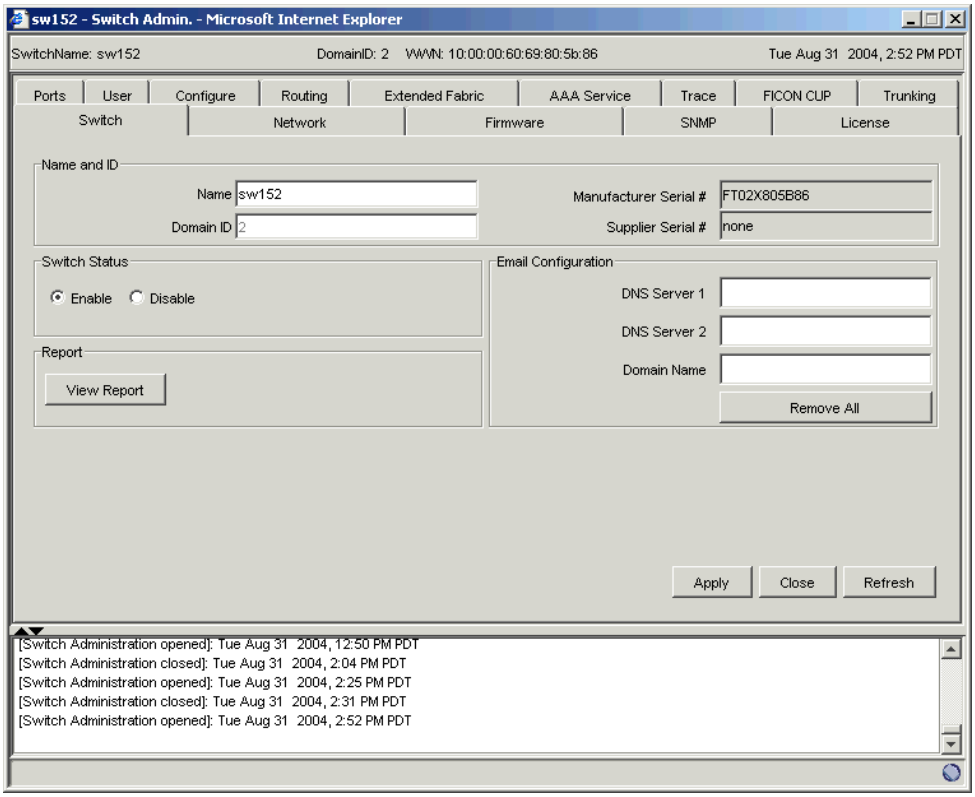


Figure 6 Switch Admin module

When you click the **Admin** button from the Switch View, you must log in as an admin to launch the Switch Admin module. Information displayed in the Switch Admin module is *not* updated automatically by Advanced Web Tools. To update the information displayed in the Switch Admin module, see "Refreshing the Switch Admin module" on page 43.

CAUTION: Any changes you make in the Switch Admin module are in a buffered environment and are not applied to the switch until you save the changes. (The exception to this is the **License** tab, where changes are applied immediately and there is no Apply button.) If you close the Switch Admin module without saving your changes, your changes are lost. To save the buffered changes you make in the Switch Admin module to the switch, click **Apply** before closing the module or before switching to another tab.

Some of the management tasks for the Core Switch 2/64 and SAN Director 2/128 are performed through the Hi Avail module. This module and the associated tasks are described in "Administering high availability" on page 73.

You can also use telnet commands to perform management tasks. Refer to "Launching the Telnet window" on page 43 for information on how to launch a telnet window through Advanced Web Tools.

The remainder of this section describes basic Switch Admin module procedures that are useful for many switch-management operations.

Launching the Switch Admin module

Most of the management procedures in this chapter are performed from the Switch Admin module. To access the Switch Admin module:

1. Select a switch from the Fabric Tree.

   The selected switch appears in the Switch View.

2. Click the **Admin** button 

from the Switch View.

   The login dialog box opens.

3. Enter the user name of an account with the admin role.
4. Enter the password.

The Switch Admin module opens (as shown in Figure 6 on page 42).

Refreshing the Switch Admin module

You can refresh the fabric element information displayed at any time using the following procedure. Note that when you click a different tab in the Switch Admin module, the information in the newly selected tab is automatically refreshed.

To refresh the fabric information, click the **Refresh** button in any tabbed page of the Switch Admin module.

Launching the Telnet window

When you launch a telnet window for the Core Switch 2/64 or SAN Director 2/128, it is on a logical-switch basis. This means that for each logical switch, you must launch a separate telnet window. Refer to the *HP StorageWorks Fabric OS 4.x command reference guide* for information about the telnet commands.



NOTE: Advanced Web Tools does not support telnet on the Mozilla browser. You must use an external CLI with Mozilla.

Telnet access to a switch and the Telnet button in Advanced Web Tools are both disabled when secure mode is enabled for a fabric. You must use sectelnet or SSH to access the Fabric OS CLI in a secure fabric. These capabilities are not accessible from Advanced Web Tools. For more information on sectelnet or SSH, refer to the *HP StorageWorks Secure Fabric OS user guide*.

To access telnet through Advanced Web Tools:

1. Select a switch from the Fabric Tree.

   The selected switch appears in the Switch View.

2. Click the **Telnet** button 

from the Switch View.

   The Telnet window opens.

3. To close the session when you are finished, issue the `exit` command at the telnet prompt.

Configuring IP and netmask information

When you configure IP and netmask information for the Core Switch 2/64 or SAN Director 2/128, the configuration is on a logical-switch basis. This means that for each logical switch, you must also configure IP and subnet mask information individually.

To configure IP and netmask information:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Network** tab (see Figure 7).
3. Type a new value in the appropriate field (for example, `123.123.123.123`).
4. For the Core Switch 2/64 or SAN Director 2/128 only:
   a. Click **Advanced**.
   b. Enter a valid IP addresses for the Ethernet IP and subnet mask for CP0 and CP1.
   c. Click **OK** to return to the Network tab.
5. Click **Apply**.
6. Exit and relaunch Advanced Web Tools to continue working.

NOTE: When changing the Ethernet IP/netmask, the Gateway IP, or the Fibre Channel net IP/netmask from Advanced Web Tools, there is a normal loss of network connection to the switch. If the IP properties changed, you must close all current windows and restart Advanced Web Tools with the new IP address.

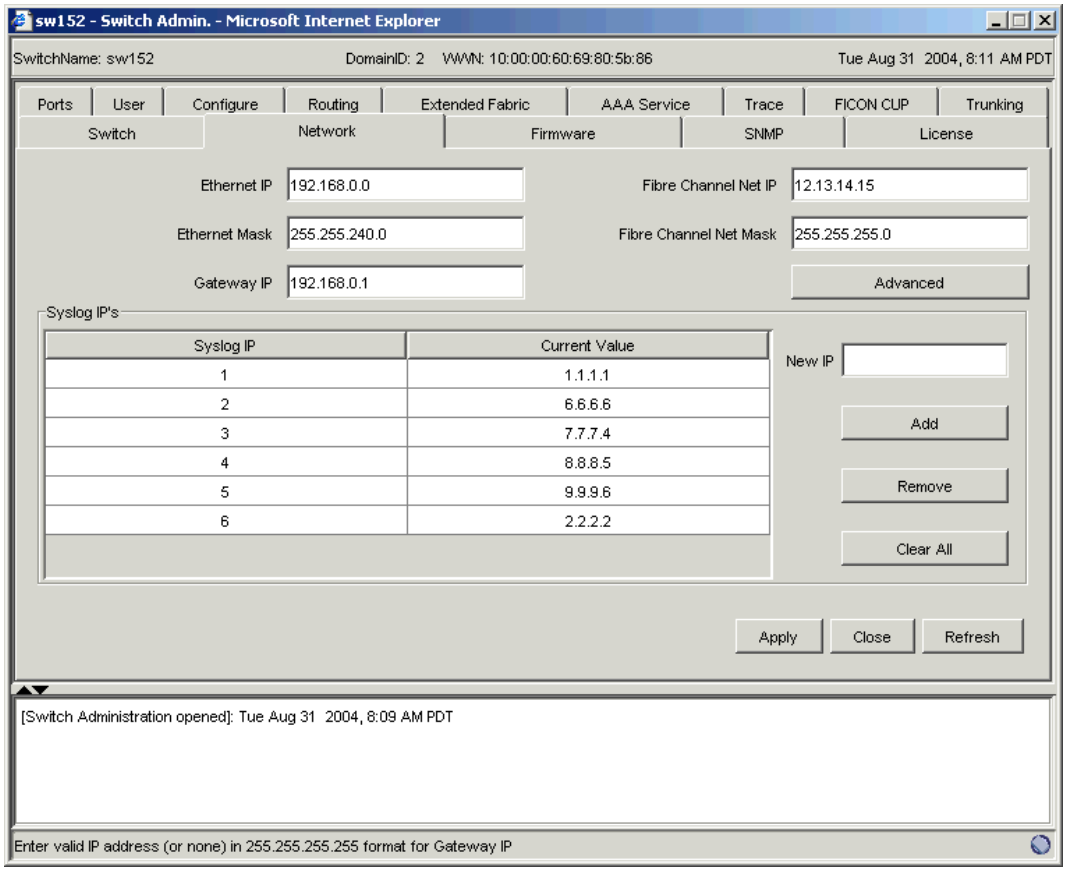


Figure 7 Network tab

Configuring a syslog IP address

The syslog IP address is the IP address of the server that is running the syslog process. The syslog daemon reads and forwards system messages to the appropriate log files and users, depending on the system configuration. When one or more IP addresses are configured, the switch forwards all error log entries to the syslog on the specified servers. Up to six servers are supported. Refer to the *HP StorageWorks Fabric OS 4.x procedures user guide* for more information on configuring the syslog daemon.

When you configure a syslog IP address for the Core Switch 2/64 or SAN Director 2/128 configured with two logical switches, the configuration is on a logical-switch basis. This means that for each logical switch, you must configure a syslog IP address individually.

To configure the syslog IP address:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Network** tab (see Figure 7 on page 44).
3. Enter a valid IP address in the **New IP** field (for example, `123.123.123.123`).
4. Click **Add**.

   The configured IP address is displayed in the Syslog IP window.
5. Click **Apply**.

To remove a syslog IP address:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Network** tab.
3. Select a syslog IP from the table.
4. Click **Remove**.
5. Optional: Click **Clear All** to remove all the syslog IP addresses.
6. Click **Apply**.

Performing a firmware download

When you request a firmware download, the system first checks the file size that is to be downloaded. If the compact flash does not have enough space, Advanced Web Tools displays a message and the download does not occur.

To download a new version of the firmware:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Firmware** tab.
3. Select the **Firmware Download** radio button.
4. Enter the host IP address, user name, password, and fully-qualified path to the file name.
5. Click **Apply**.

The firmware download begins. You can monitor the firmware download status on the Firmware Download progress bar (see Figure 8).

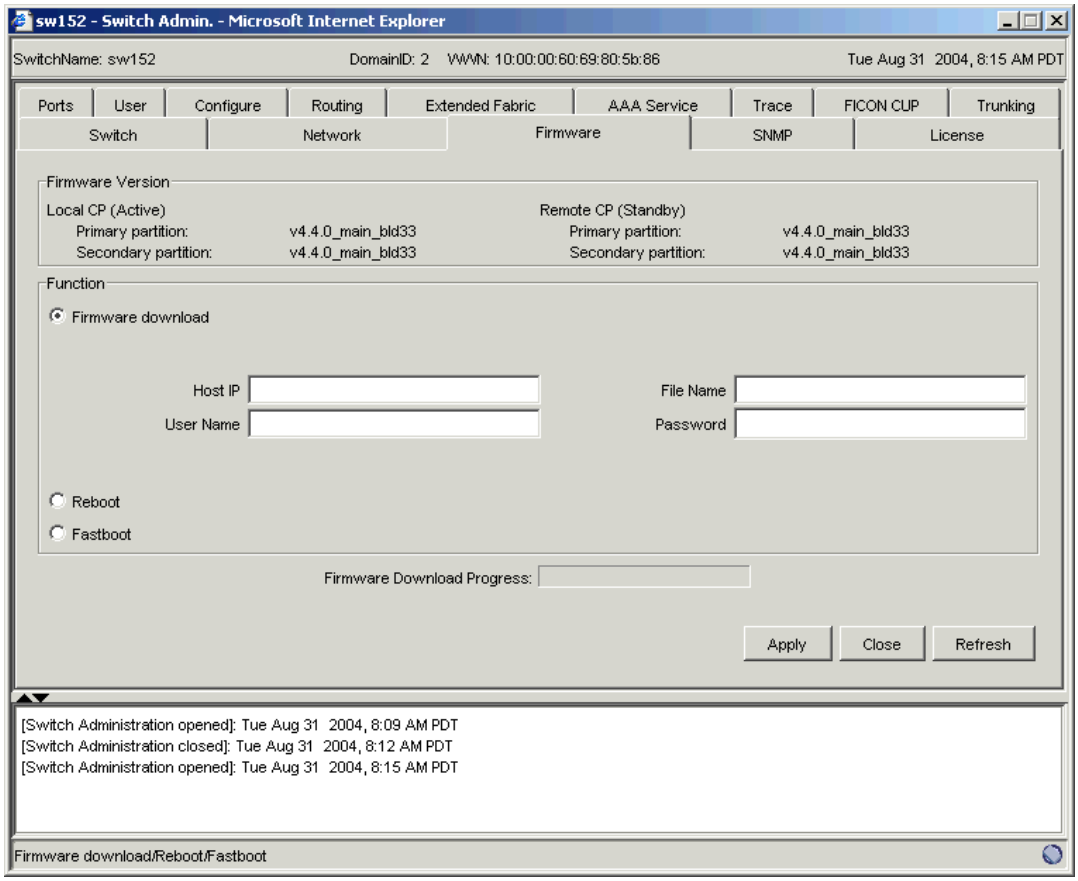


Figure 8 Firmware tab

Configuring a switch

Use the Switch tab of the Switch Admin module to perform basic switch configuration. Figure 6 on page 42 shows an example of the Switch tab.

Enabling and disabling a switch

You can determine whether a switch is enabled or disabled in the Switch Admin module by looking at the bottom right corner: the icon means that the switch is enabled, and the icon means that the switch is disabled.

To enable or disable a switch:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Switch** tab.
3. Select the **Enable** radio button in the Switch Status section to enable the switch, or select the **Disable** radio button to disable the switch.
4. Click **Apply**.

Changing the switch name

Switches can be identified by IP address, domain ID, World Wide Name (WWN), or by customized switch names that are unique and meaningful.

Switch names can be a maximum of 15 characters for Fabric OS v4.x. They must begin with an alphabetic character, but otherwise can consist of any combination of alphanumeric and underscore characters.

To change the switch name:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Switch** tab.
3. Enter a new name in the Name field.
4. Click **Apply**.



NOTE: With Fabric OS v4.x, HP recommends that you customize the chassis name for each switch. Some system messages identify a switch service by chassis name, so if you assign meaningful chassis names in addition to meaningful switch names, logs are more useful. Change the chassis name using the CLI. Refer to the *HP StorageWorks Fabric OS 4.x procedures user guide* for instructions on changing the chassis name.

Changing the switch domain ID

Although domain IDs are assigned dynamically when a switch is enabled, you can request a specific ID to resolve a domain ID conflict when you merge fabrics.

To change the switch domain ID:

1. Launch the Switch Admin module as described on page 43.
2. Disable the switch, as described in "Enabling and disabling a switch" on page 46.
3. Click the **Switch** tab.
4. Enter a new domain ID in the Domain ID field (the domain ID is an integer between 1 and 239).
5. Click **Apply**.
6. Enable the switch, as described in "Enabling and disabling a switch" on page 46.

Viewing and printing a switch report

The switch report includes the following information:

- A list of switches in the fabric
- Switch configuration parameters
- A list of ISLs and ports
- Name Server information
- Zoning information
- SFP serial ID information

To view or print a switch report:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Switch** tab.
3. Click **View Report**.

   A switch report opens in a new window.
4. View or print the report using your browser.

Rebooting the switch

When you reboot the switch, the reboot takes effect immediately.

Performing a fast boot

A fast boot reduces boot time significantly by bypassing power-on self test (POST). To perform a switch fast boot:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Firmware** tab (see Figure 8 on page 46).
3. Select the **Fastboot** radio button.
4. Click **Apply**.

Performing a reboot

Use the following procedure to reboot the CP and execute the normal power-on booting sequence:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Firmware** tab (see Figure 8 on page 46).
3. Select the **Reboot** radio button.
4. Click **Apply**.

Configuring fabric parameters

When you configure fabric parameters for the Core Switch 2/64 or SAN Director 2/128 configured with two logical switches, the configuration is on a logical-switch basis. This means that for each logical switch, you must configure fabric parameters individually.



NOTE: You must disable the switch before you can configure fabric parameters.

You can configure the following fabric parameters with the Configure tab and Fabric subtab of the Switch Admin module (as shown in Figure 9 on page 50):

- BB Credit: Configures the number of buffers that are available to attached devices for frame receipt. The default BB Credit is 16. The range is 1 through 27.
- R_A_TOV: Resource allocation time-out value (in milliseconds). This variable works with the E_D_TOV to determine switch actions when presented with an error condition. The default is 10000. The possible range is 4000 through 120000.

- E_D_TOV: Error detect time-out value (in milliseconds). This timer is used to flag a potential error condition when an expected response is not received within the set time. The valid range is 1000 through 5000.
- Datafield size: The largest possible data field size (in bytes). The valid range is 256 through 2112.
- Switch PID Format: Select a switch port identifier (PID) format from one of the following:
  - Format 1 (0-base, 256 encoding)
  - Format 2 (16-base, 256 encoding)
- Sequence Level Switching: Select this check box to enable frames of the same sequence from a specific group to be transmitted together. When this option is not selected, frames are transmitted interleaved among multiple sequences. Under normal circumstances, sequence-level switching should be disabled for better performance. However, some host adapters have issues when receiving interleaved frames among multiple sequences.
- Disable Device Probing: Set this mode only if the switch N_Port discovery process (PLOGI, PRLI, INQUIRY) causes an attached device to fail. When set, devices that do not register with the Name Server are not present in the Name Server data base. Set this mode only if the switch N_Port discovery process (PLOGI, PRLI, INQUIRY) causes an attached device to fail.
- Per-Frame Routing Priority: Choose to select or deselect per-frame routing priority. When enabled, the virtual channel ID is used with a frame header to form the final virtual channel ID.
- Suppress Class F Traffic: Applies only if VC-encoded address mode is also set. When selected, translative addressing (which allows private devices to communicate with public devices) is disabled.
- Insistent Domain ID Mode: Set this mode to make the current domain ID persistent across reboots, power cycles, and failovers. This mode is required fabric-wide to transmit FICON® data.

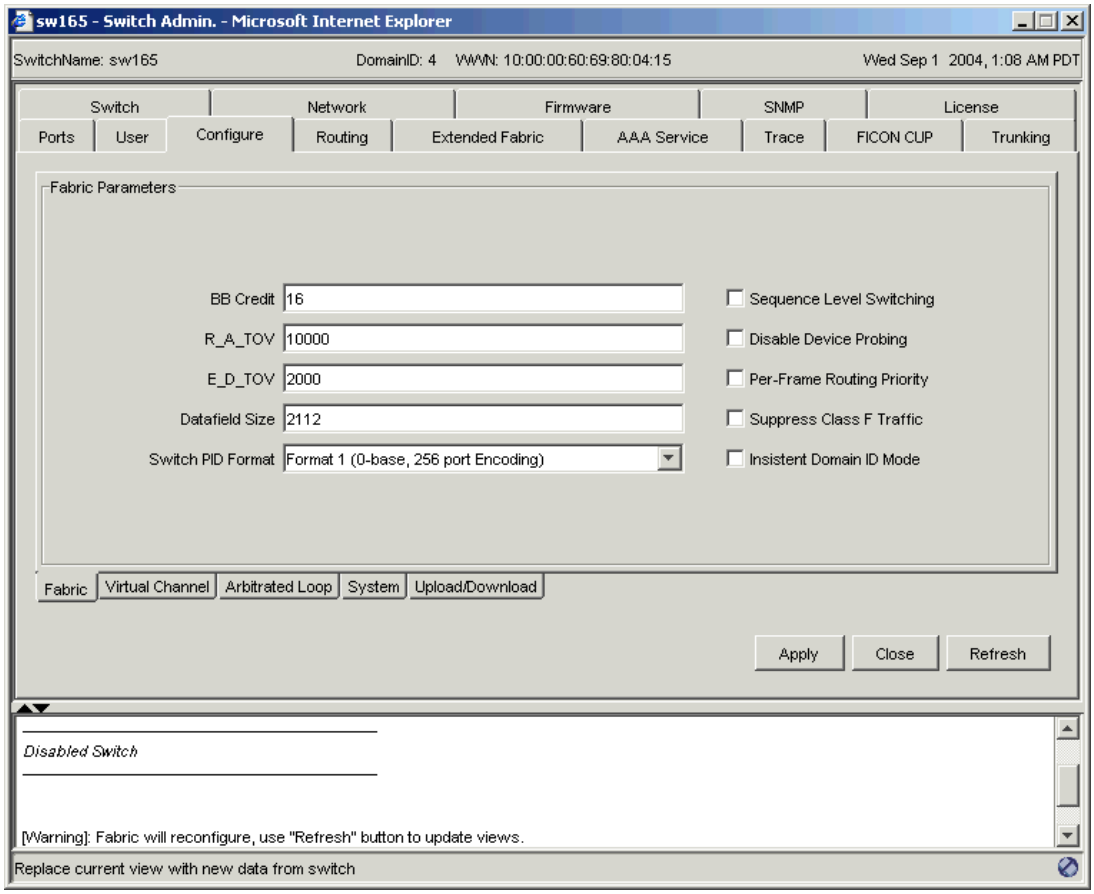


Figure 9 Configure tab, Fabric subtab

To configure fabric parameters:

1. Launch the Switch Admin module as described on page 43.
2. Disable the switch (see "Enabling and disabling a switch" on page 46).
3. Click the **Configure** tab.
4. Click the **Fabric** subtab.
5. Make the fabric parameter configuration changes.
6. Click **Apply**.
7. Enable the switch (see "Enabling and disabling a switch" on page 46).

Enabling insistent domain ID mode

When insistent domain ID mode is enabled, the current domain setting for the switch is persistent; that is, the same ID is requested during switch reboots, power cycles, CP failovers, firmware downloads, and fabric reconfigurations. If the fabric does not assign the insistent domain ID, the switch segments from the fabric.

When you enable insistent domain ID mode for the Core Switch 2/64, the configuration is on a logical-switch basis. This means that for each logical switch, you must enable insistent domain ID mode individually.

To enable insistent domain ID mode:

1. Launch the Switch Admin module as described on page 43.
2. Disable the switch (see "Enabling and disabling a switch" on page 46).
3. Click the **Configure** tab.
4. Click the **Fabric** subtab.
5. Select the **Insistent Domain ID Mode** check box.
6. Click **Apply**.
7. Enable the switch (see "Enabling and disabling a switch" on page 46).

Configuring FAN frame notification parameters

You can specify whether fabric access notification (FAN) frames are sent to public loop devices to notify them of their node ID and address.

When you configure FAN frame notification parameters for the Core Switch 2/64 or SAN Director 2/128 configured with two logical switches, the configuration is on a logical-switch basis. This means that for each logical switch, you must configure FAN frame notification parameters individually.

To configure FAN frame notification parameters:

1. Launch the Switch Admin module as described on page 43.
2. Disable the switch (see "Enabling and disabling a switch" on page 46).
3. Click the **Configure** tab.
4. Click the **Arbitrated Loop** subtab.
5. Select the **Send FAN Frames** check box.
6. Click **Apply**.
7. Enable the switch (see "Enabling and disabling a switch" on page 46).

Configuring ports

Use the **Ports** tab of the Switch Admin module to perform the basic port configuration procedures described in this section. Figure 10 shows an example of the **Ports** tab.

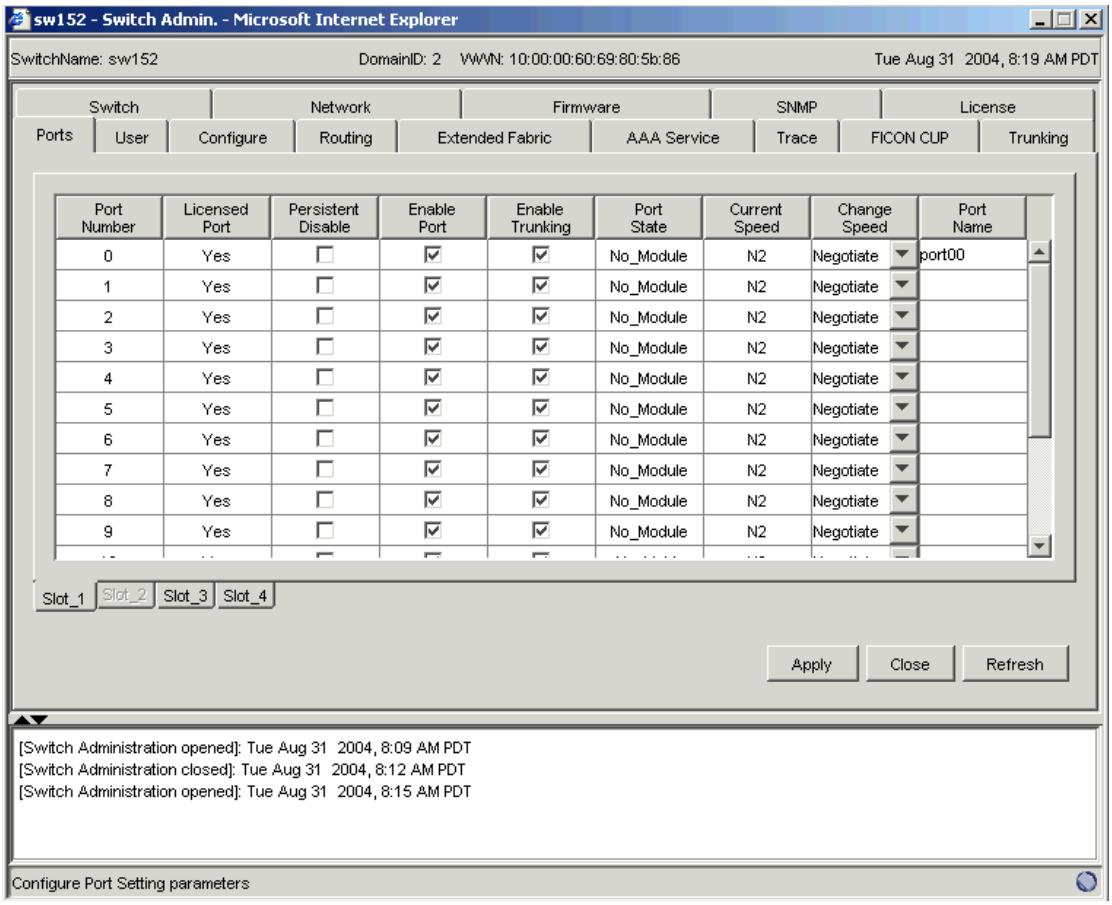


Figure 10 Ports tab

Configuring port speed

The Current Speed column in the Ports tab indicates the current speed of the port. Use the following procedure to change or configure the port speed:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Ports** tab.
3. Perform of the following, depending on the type of switch:
   - For Core Switch 2/64 and SAN Director 2/128, select the subtab that corresponds to the correct slot for the logical switch.
   - For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, proceed directly to the next step.
4. Select a port speed from the Change Speed list corresponding to the port for which you want to change the speed.
5. Click **Apply**.

Assigning a name to a port

Port names are optional. You can assign a name to a port to make port grouping easier. The Port Name column in the **Ports** tab displays the port name, if one exists.

To name a port:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Ports** tab.
3. Perform of the following, depending on the type of switch:
   - For Core Switch 2/64 and SAN Director 2/128, select the slot subtab that corresponds to the correct slot for the logical switch.
   - For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, proceed directly to the next step.
4. Double-click in the **Port Name** field for the port you want to change.
5. Enter a name for the port.

   Port names can be from 0 through 32 alphanumeric characters, unless FICON Management Server (FMS) mode is enabled; if FMS mode is enabled, port names should be limited from 0 through 24 alphanumeric characters. Although it is not required that port names be unique, it is recommended.
6. Click **Apply**.

Disabling a port over reboots

Use the following procedure to disable a port so that it remains disabled if the switch reboots:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Ports** tab.
3. Perform of the following, depending on the type of switch:
   - For Core Switch 2/64 and SAN Director 2/128, select the slot subtab that corresponds to the correct slot for the logical switch.
   - For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, proceed directly to the next step.
4. Select the **Persistent Disable** check box for that port you want to keep disabled over reboots.
5. Click **Apply**.

Enabling and disabling a port

All licensed ports are enabled by default. You can disable and reenable them as necessary.

For the SAN Switch 4/32, if a port is not licensed you cannot enable it until you install the Ports on Demand license. (Refer to "Activating ports on demand" on page 54 for more information.) The Licensed Port column indicates whether a port is licensed.



NOTE: If you disable a *principal* ISL port (an ISL port that is used to communicate with the principal switch), the fabric reconfigures. If the port was connected to a device, that device is no longer accessible from the fabric. For more information, refer to the *HP StorageWorks Fabric OS 4.x features overview guide*.

To enable or disable a port:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Ports** tab.
3. Perform of the following, depending on the type of switch:
   - For Core Switch 2/64 and SAN Director 2/128, select the slot subtab that corresponds to the correct slot for the logical switch.
   - For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, proceed directly to the next step.
4. Select the box in the Enable Port column that corresponds to the port you want to enable or un-select the box in the Enable Port column that corresponds to the port you want to disable.
5. Click **Apply**.
6. Review the log at the bottom of the tab for information regarding the switch configuration changes.

Activating ports on demand

The SAN Switch 4/32 can be purchased with 16 or 32 ports activated. If you have purchased a SAN Switch 4/32 with 16 ports active, you can activate the remaining ports by purchasing and installing an 8-port upgrade license for each additional 8 ports that you want to add.

Ports on Demand is ready to be unlocked in the switch firmware. Its license might be part of the licensed Paper Pack supplied with switch software, or you can purchase the license separately from your switch vendor, who will provide you with a key to unlock it.

By default, ports 0–15 are enabled on the SAN Switch 4/32. To enable ports 16–23, install and enable the optional 8-port upgrade license. To enable ports 24-31, install and enable another 8-port upgrade license. The first license key must be installed first, before you can use the second license.

After you have installed the license keys, you must enable the ports. You can do so without disrupting switch operation, as described in "Enabling and disabling a port" on page 53. Alternatively, you can disable and reenable the switch to activate all ports as described in "Enabling and disabling a switch" on page 46.

To unlock an 8-port upgrade license, you can either use the supplied license key or generate a license key. If you need to generate a key, launch an Internet browser and go to the HP licensing web site at http://webkey.external.hp.com/welcome.asp. Select **Generate a license key** and follow the instructions to generate the key.

To enable Ports on Demand:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Ports** tab.

   In the Ports tab, the Licensed Port column indicates whether the port is licensed.
3. Install 8-port upgrade license.

   For instructions, see "Maintaining licensed features" on page 62.
4. Enable the ports, as described in "Enabling and disabling a port" on page 53.

If you remove the 8-port upgrade license, the licensed ports become disabled after the next platform reboot or the next port deactivation.

Configuring a port for long distance

The Extended Fabric tab of the Switch Admin module displays information about the port speed, long distance setting, and buffer credits, as shown in Figure 11 on page 56. Use this tab to configure the long-distance setting of a port. For detailed information on managing extended fabrics, refer to the *HP StorageWorks Fabric OS 4.x procedures user guide*.

When you configure a long-distance ISL, ensure that the ports on both sides of the ISL have the same configuration to avoid fabric segmentation.

The port speed is displayed as follows:

- `1G` for 1 Gbps
- `2G` for 2 Gbps
- `4G` for 4 Gbps
- `N1` for Negotiated 1 Gbps
- `N2` for Negotiated 2 Gbps
- `N4` for Negotiated 4 Gbps
- `Auto-Negotiation`

Table 6 describes the long-distance settings and identifies settings that require an HP Extended Fabrics license.

Table 6 Long-distance settings and license requirements

Value	Description	Extended fabric license required
`L0`	No long-distance setting is enabled. The maximum supported link distance is 10 km, 5 km, or 2.5 km for ports at speeds of 1 Gbps, 2 Gbps, and 4 Gbps, respectively.	No
`LE`	Extended normal setting is enabled, 10 km (6 miles) or less.	No
`L0.5`	25 km (15.5 miles) or less.	Yes
`L1`	Medium long-distance setting is enabled, 50 km (31 miles) or less.	Yes
`L2`	Long-distance setting is enabled, 100 km (62 miles) or less.	Yes
`LD`	Dynamic setting is enabled. The LD-level link can operate at distances up to 500 km at 1 Gbps, 250 km at 2 Gbps, or 125 km at 4 Gbps, depending on the availability of frame buffers within the port group.	Yes

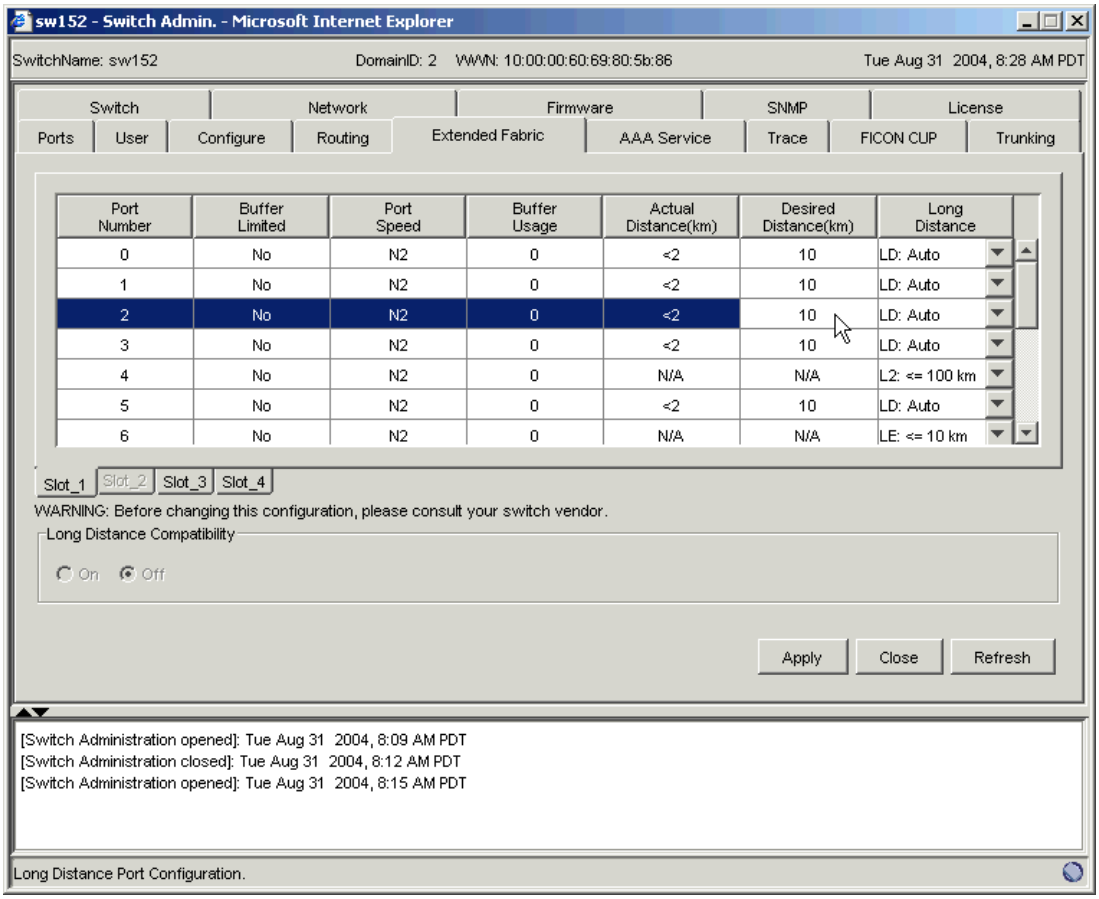


Figure 11 Extended Fabric tab

To configure a port for long-distance connection:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Extended Fabric** tab.
3. Perform of the following, depending on the type of switch:
   - For Core Switch 2/64 and SAN Director 2/128, select the slot subtab that corresponds to the correct slot for the logical switch.
   - For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, proceed directly to the next step.
4. Select a port by clicking anywhere in the row for that port.
5. Select a distance from the Long Distance list that corresponds to the port.

   Depending on the distance selected, a license may be required. For information about the various distances, see Table 6 on page 55.

   If you select a long-distance setting of `LD`, you must also enter a value in the Desired Distance column for that port number:

   a. Double-click the **Desired Distance** field for the port, as shown in Figure 11.

   b. Enter a number in the field to indicate the distance in kilometers:

   For 1 Gbps ports, enter a number between 10 and 500, inclusive.
   For 2 Gbps ports, enter a number between 10 and 250, inclusive.
   For 4 Gbps ports, enter a number between 10 and 125, inclusive.

This value is the upper limit for calculating buffer availability for other ports in the same port group. If the actual distance is more than the desired distance, the port operates in buffer-limited mode.

c. Press **Enter** or click another port entry for the value to be accepted.

6. Optional: To enable long-distance compatibility so that ISLs in a fabric can be up to 100 km long (the exact distance level is determined by the per-port configuration on the E_Ports of each ISL), select the **On** radio button for Long Distance Compatibility.



NOTE: The switch must be disabled before you can select this option. If you select this option, you must have an Extended Fabrics license, and both E_Ports in an ISL must be configured with the same long-distance compatibility setting.

7. Click **Apply**.

Configuring routes

Routing policies are configured from the CLI. For Fabric OS v4.x, the supported routing policies are:

- Port-based
- Device-based (SAN Switch 4/32 only)
- Exchanged-based (SAN Switch 4/32 only)

For the SAN Switch 4/32, the exchange-based routing policy is the default.

To optimize port-based routing, enable the dynamic load sharing feature (DLS) to balance the load across the available output ports within a domain. Device-based and exchange-based routing require the use of DLS; when these policies are in effect, you cannot disable the DLS feature.

Using port-based routing, you can assign a *static route*, in which the path chosen for traffic never changes. In contrast, device-based and exchange-based routing policies always employ *dynamic path selection*, in which the software chooses a path based on current traffic conditions. Refer to the *HP StorageWorks Fabric OS 4.x procedures user guide* for more information.

The Routing tab of the Switch Admin module displays routing information. Figure 12 shows the Routing tab when the port-based routing policy is enabled. When a device-based or exchange-based routing policy is enabled, the interface is different: the Static Route information and the Dynamic Load Sharing radio buttons are not displayed.

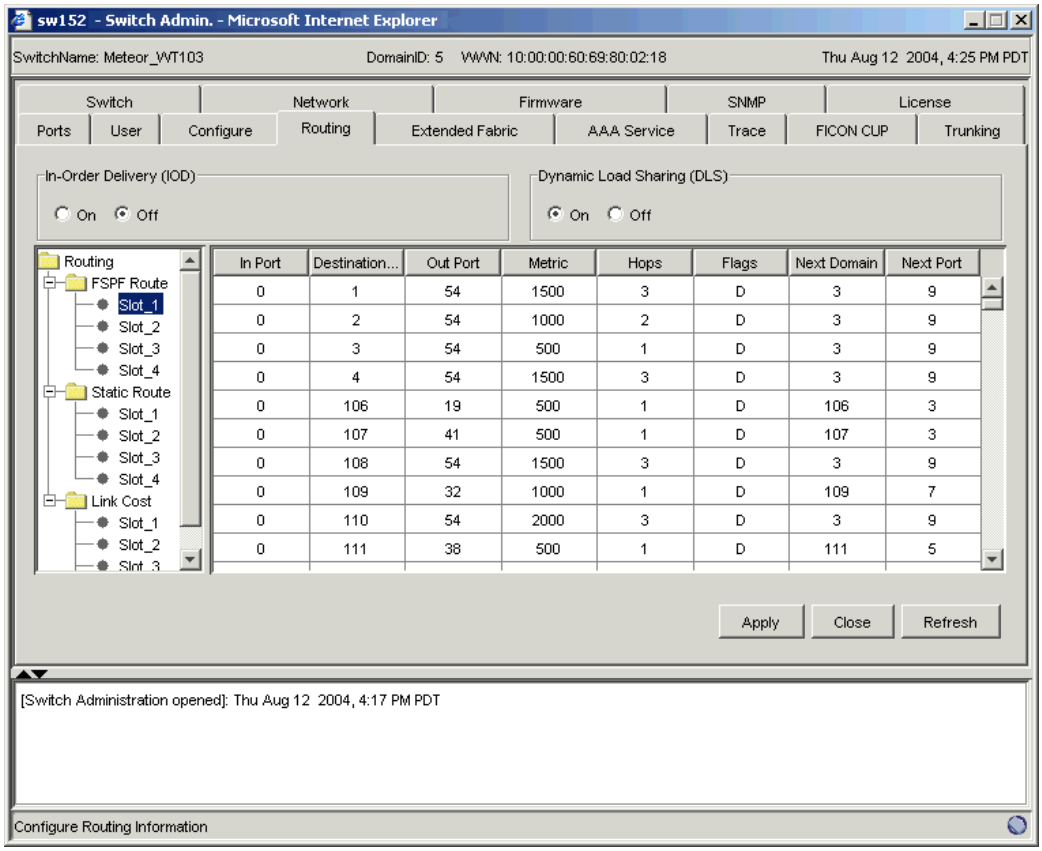


Figure 12 Routing tab for port-based routing policy

Displaying fabric shortest path first (FSPF) routing

The **Routing** tab of the Switch Admin module displays information about routing paths.

To view FSPF routing:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Routing** tab.
3. Perform of the following, depending on the type of switch:
   - For Core Switch 2/64 and SAN Director 2/128, click a slot number under the FSPF Route category in the navigation tree.
   - For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, select the FSPF Route category in the navigation tree.

Configuring a static route

A static route can be assigned only when the active routing policy is port-based. When device-based or exchange-based routing is active, you cannot disable DLS and you cannot view and configure static routes.

When you configure a static route for a Core Switch 2/64 or a SAN Director 2/128 configured for two logical switches, the configuration is on a logical-switch basis. This means that for each logical switch, you must configure a static route individually.

To configure a static route:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Routing** tab.
3. Perform of the following, depending on the type of switch:
   - For Core Switch 2/64 and SAN Director 2/128, select a slot number under the Static Route category in the navigation tree and then click **Add**.
   - For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, select the Static Route category in the navigation tree and then click **Add**.

   A new blank line appears in the window.



NOTE: When device-based or exchange-based routing policies are in effect, the Static Route category does not appear in the navigation tree.

4. Enter the In Port number for the route.
5. Enter the Destination Domain.

   The destination domain IDs match the outports in the cell.
6. Enter the Out Port number for the route.
7. Click **OK** to add the static route.
8. Click **Apply**.

Enabling and disabling dynamic load sharing

The device-based and exchange-based routing policies depend on the Fabric OS dynamic load sharing (DLS) feature for dynamic routing path selection. When these policies are in force, DLS is always enabled and cannot be disabled.

When the port-based policy is in force, you can enable DLS to optimize routing. When DLS is enabled, it shares traffic among multiple equivalent paths between switches. DLS recomputes load sharing either when a switch boots up or each time an E_Port or Fx_Port goes online or offline. Enabling this feature allows a path to be discovered automatically by the FSPF path-selection protocol.

For more information regarding DLS, refer to the `dlsset` command in the *HP StorageWorks Fabric OS 4.x command reference guide*.

When you enable or disable dynamic load sharing for the Core Switch 2/64 and SAN Director 2/128 configured for two logical switches, the configuration is on a logical-switch basis. This means that for each logical switch, you must enable or disable dynamic load sharing individually.

To configure the DLS setting:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Routing** tab.
3. Select **On** in the Dynamic Load Sharing area to enable dynamic load sharing or select **Off** in the Dynamic Load Sharing area to disable dynamic load sharing.



NOTE: When device-based or exchange-based routing policies are in effect, the DLS radio buttons do not appear in the Routing tab.

4. Click **Apply**.

Specifying frame order delivery

In a stable fabric, frames are always delivered in order, even when the traffic between switches is shared among multiple paths. However, when topology changes occur in the fabric (for example, if a link goes down), traffic is rerouted around the failure, and some frames could be delivered out of order.

By default, frame delivery is out-of-order across topology changes. However, if the fabric contains destination devices that do not support out-of-order delivery, you can force in-order frame delivery across topology changes.

Enabling in-order delivery (IOD) guarantees that frames are either delivered in order or dropped. For more information regarding IOD, refer to the *HP StorageWorks Fabric OS 4.x procedures user guide*.

When you enable or disable IOD for the Core Switch 2/64 and SAN Director 2/128 configured for two logical switches, the configuration is on a logical-switch basis. This means that for each logical switch, you enable or disable IOD individually.

To configure the IOD setting:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Routing** tab.
3. Select **On** in the In-Order Delivery area to force in-order frame delivery across topology changes or select **Off** in the In-Order Delivery area to restore out-of-order frame delivery across topology changes.



NOTE: Enabling in-order delivery can cause a delay in the establishment of a new path when a topology change occurs, and therefore should be used with care.

4. Click **Apply**.

Configuring link cost

When you configure link cost for the Core Switch 2/64 or SAN Director 2/128 configured for two logical switches, the configuration is on a logical-switch basis. This means that for each logical switch, you configure link cost individually.

For information regarding link cost, refer to the `linkCost` command in the *HP StorageWorks Fabric OS 4.x command reference guide*.

To configure the link cost for a port:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Routing** tab.
3. Perform of the following, depending on the type of switch:
   - For Core Switch 2/64 and SAN Director 2/128, select the slot number of the logical switch under Link Cost in the navigation tree.
   - For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, select **Link Cost** in the navigation tree.
4. Double-click in the row in the Cost column that corresponds to the appropriate port.
5. Type the link cost.

   For a 1 Gbps ISL, the default cost is 1000. For a 2 Gbps or a 4 Gbps ISL, the default cost is 500. Valid values for link cost range from 1 through 9999. Setting the value to `0` sets the link cost to the default value for that port.
6. Click **Apply**.

Maintaining configurations

It is important to maintain consistent configuration settings on all switches in the same fabric, because inconsistent parameters (such as inconsistent PID formats) can cause fabric segmentation. As part of standard configuration maintenance procedures, HP recommends that you back up configuration data for every switch on a host computer server for emergency reference.

The following sections contain procedures for basic switch configuration maintenance. Use the Configure tab and Upload/Download subtab of the Switch Admin module to perform these tasks. (See Figure 13.)

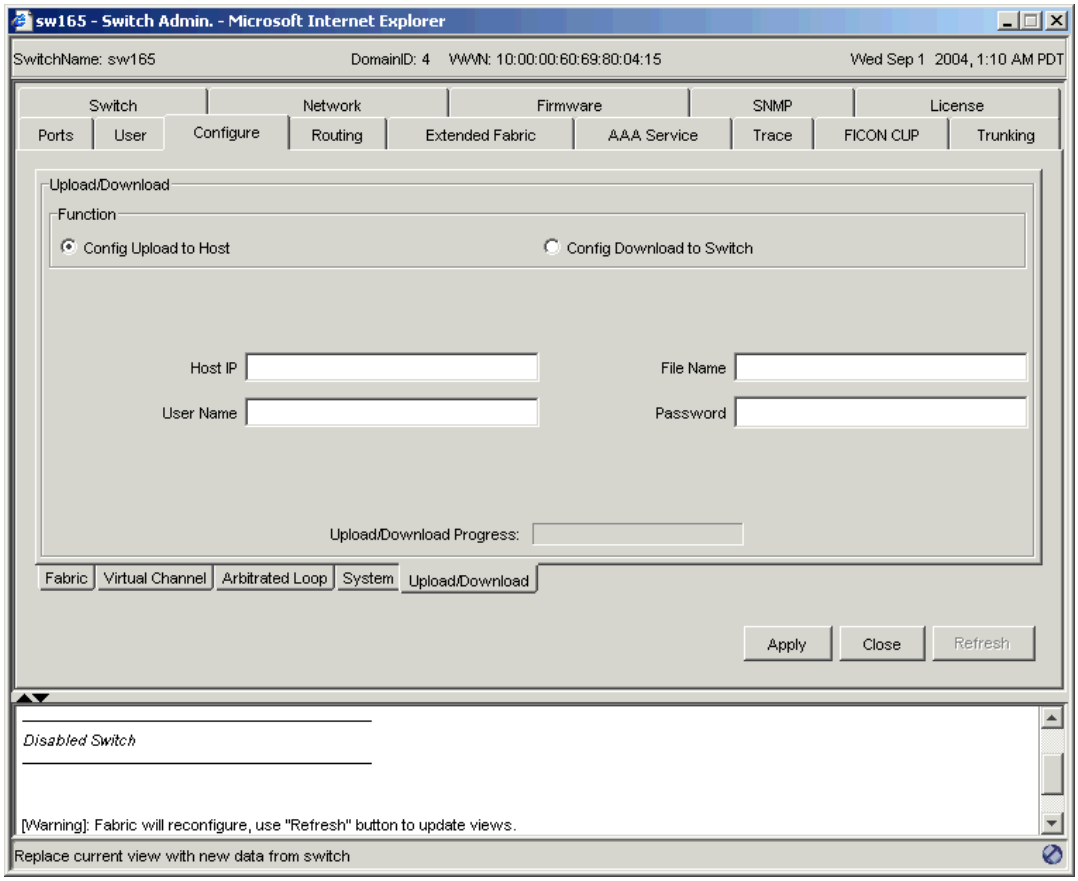


Figure 13 Configure tab, Upload/Download subtab

Backing up a configuration file

Keep a backup copy of the configuration file in case the configuration is lost or unintentional changes are made. Keep individual backup files for all switches in the fabric and avoid copying configurations from one switch to another.

When you back up a configuration file for the Core Switch 2/64 or for a SAN Director 2/128 configured with two logical switches, the configuration is on a logical-switch basis. This means that you must back up a separate configuration file for each logical switch.

To back up a configuration file:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Configure** tab.
3. Click the **Upload/Download** subtab (see Figure 13).
4. Select the **Config Upload to Host** radio button.

5. Enter the user name, password, and host IP information.
6. Enter the configuration file with a fully-qualified path.
7. Click **Apply**.

You can monitor the progress by looking at the Upload/Download Progress bar on the Configure tab.

Restoring a configuration

Restoring a configuration involves overwriting the configuration on the switch by downloading a previously saved backup configuration file. Perform this procedure during a planned down time.

Make sure that the configuration file you are downloading is compatible with your switch model, because configuration files from other model switches might cause your switch to fail.

To download a configuration to the switch:

1. Launch the Switch Admin module as described on page 43.
2. Disable the switch, as described in "Enabling and disabling a switch" on page 46.

   You can download configurations only to a disabled (offline) switch.
3. Click the **Configure** tab.
4. Click the **Upload/Download** subtab (see Figure 13 on page 61).
5. Select the **Config Download to Switch** radio button.
6. Enter the user name, password, and host IP information.
7. Enter the configuration file with a fully-qualified path.
8. Click **Apply**.

   You can monitor the progress by looking at the Upload/Download Progress bar on the Configure tab.
9. Enable the switch, as described in "Enabling and disabling a switch" on page 46.

Maintaining licensed features

Feature licenses may be supplied with switch software, or you can purchase licenses separately from your switch vendor, who will provide you with keys to unlock the features. License keys are provided on a per-chassis basis, so for products that support multiple logical switches (domains), a license key applies to all domains within the chassis.

The licensed features currently installed on the switch are listed in the License tab of the Switch Admin module, as shown in Figure 14. If the feature is listed, it is installed and immediately available. When you enable some licenses, such as ISL Trunking, you may need to change the state of the port to enable the feature on the link.

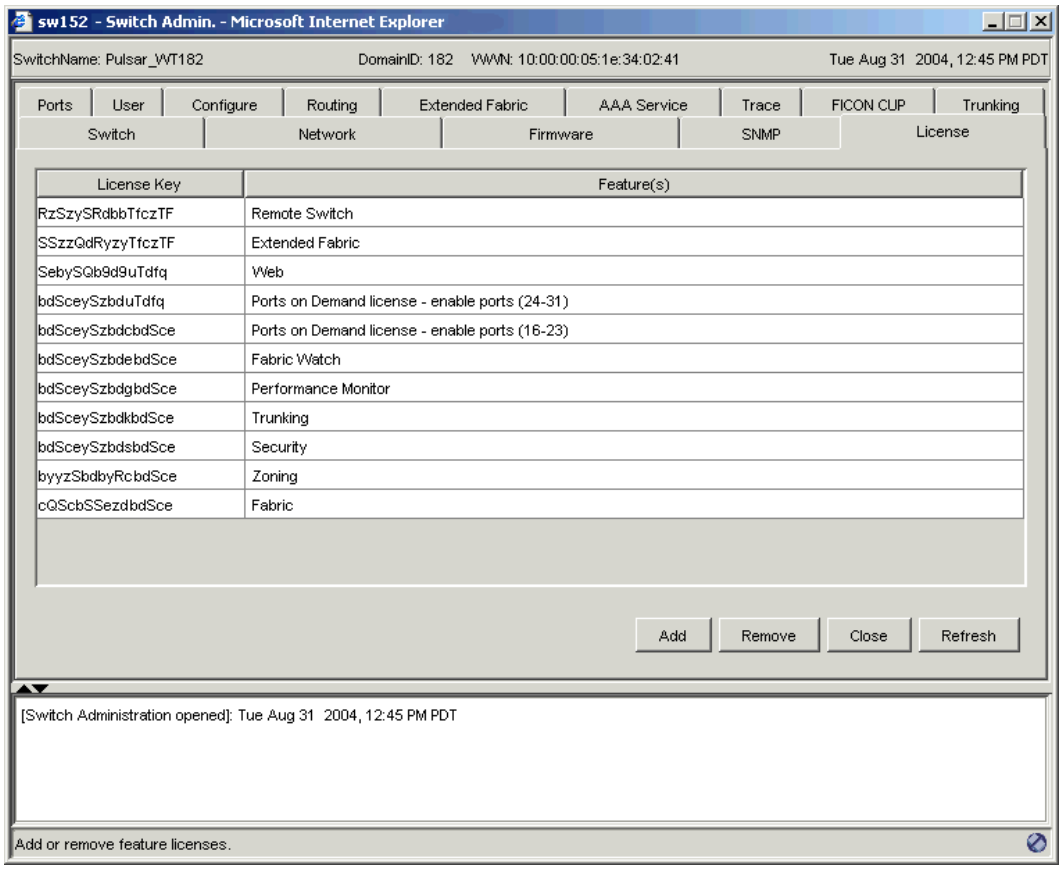


Figure 14 License tab

Activating a license on a switch

Before you can unlock a licensed feature, you must obtain a license key. You can either use the license key provided in the Paper Pack supplied with switch software or refer to the *HP StorageWorks Fabric OS 4.x procedures user guide* for instructions on how to obtain a license key.

To activate a license on a switch:

1. Launch the Switch Admin module as described on page 43.
2. Click the **License** tab.
3. Click **Add**.

   The Add License dialog box opens.
4. Paste or enter a license key in the field.
5. Click **Add License**.
6. Click **Refresh** to display the new licenses in the License tab.

NOTE: Some licenses (Trunking, for example) do not take effect until the switch is rebooted.

Removing a License from a Switch

CAUTION: Removing the Advanced Web Tools license from a switch makes that switch unavailable from Advanced Web Tools. If you remove the Advanced Web Tools license from a Core Switch 2/64 or SAN Director 2/128, both logical switches are unavailable from Advanced Web Tools.

To remove a license from a switch:

1. Launch the Switch Admin module as described on page 43.
2. Click the **License** tab.
3. Select the license you want to remove.
4. Click **Remove**.

Administering ISL trunking

Interswitch link (ISL) trunking optimizes network performance by forming trunking groups that can distribute traffic across a shared bandwidth.

A trunking license is required on each switch that participates in the trunk. (For details on obtaining and installing licensed features, see "Maintaining licensed features" on page 62.)

For additional background information about ISL Trunking, refer to the *HP StorageWorks Fabric OS 4.x features overview guide*.

Use the Trunking tab of the Switch Admin module to view and manage trunks through Advanced Web Tools (see Figure 15).

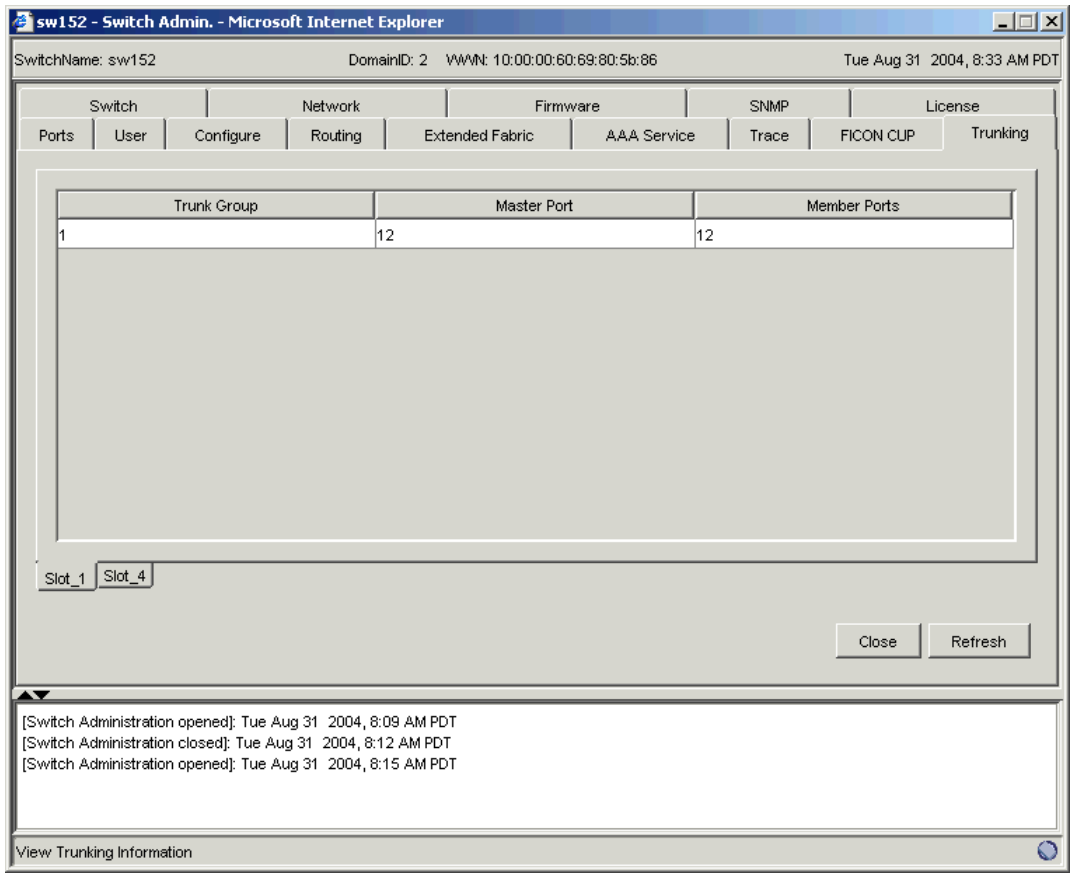


Figure 15 Trunking tab

Displaying trunk group information

Use this procedure to display the following information about ISL Trunking groups:

- Trunk group number identifier
- Master port
- Member ports

To view information on a trunk group:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Trunking** tab.
3. Optional: Click **Refresh** to refresh the information.

Disabling or reenabling trunking mode on a port

When the trunking license is activated, trunks are automatically established on eligible ISLs and trunking capability is enabled by default on all ports. Use the following procedure to disable trunking on a port or to reenable trunking if it has been disabled.

To disable or reenable trunking mode on a port:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Ports** tab (see Figure 10 on page 52).

3. Perform of the following, depending on the type of switch:
   - For Core Switch 2/64 and SAN Director 2/128, select the slot subtab that corresponds to the correct slot for the logical switch.
   - For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, proceed directly to the next step.
4. To enable trunking mode on a port, select the check box in the Enable Trunking column that corresponds to the port you want to trunk.

   To disable trunking mode on a port, un-select the box.
5. Click **Apply**.

Managing trace dumps

A trace dump is a snapshot of the running behavior within the HP StorageWorks switch. The dump can be used by developers and troubleshooters at HP to help understand what might be contributing to a specific switch behavior when certain internal events are seen. For example, a trace dump can be created each time a certain error message is logged to the system error log. Developers can then examine what led up to the message event by studying the traces.

Tracing is always on. As software on the switch executes, the trace information is placed into a circular buffer in system RAM. Periodically, the trace buffer is frozen and saved. This saved information is a *trace dump*.

A trace dump is generated when:

- It is triggered manually (use the `traceDump` command)
- A critical-level log message occurs
- A particular log message occurs (use the `traceTrig` command to set up the conditions for this)
- A kernel panic occurs
- The hardware watchdog timer expires

(For information about the `traceDump` and `traceTrig` commands, refer to the *HP StorageWorks Fabric OS 4.x command reference guide*.)

The trace dump is maintained on the switch until either it is uploaded to the FTP host or another trace dump is generated. If another trace dump is generated before the previous one is uploaded, the previous dump is overwritten.

When a trace dump is generated, it is automatically uploaded to an FTP host, if automatic FTP uploading is enabled.

Using the Trace tab of the Switch Admin module, you can view and configure the trace FTP host target, enable or disable automatic trace uploads, and manually upload a trace dump (see Figure 16).

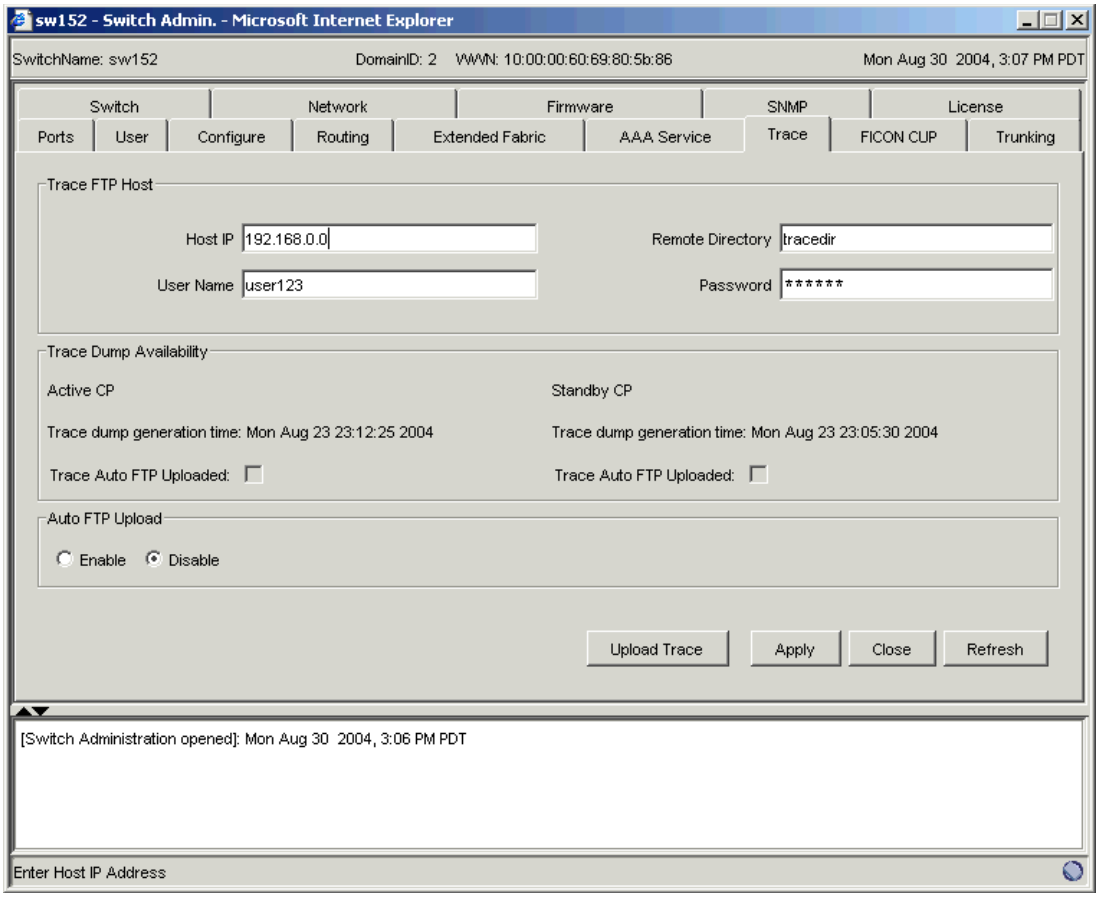


Figure 16 Trace tab

How a trace dump is used

The generation of a trace dump causes a Critical message to be logged to the system error log. When a trace dump is detected, issue the `supportSave` command on the affected switch. This command packages all error logs, the `supportShow` output, and the trace dump, and moves these to your FTP server. You can also configure your switch to automatically copy trace dumps to your FTP server (see "Setting up automatic trace dump transfers").

In addition to automatic generation of trace dumps on faults, you can also generate a trace dump manually or when certain system error messages are logged. This is normally done with assistance from HP customer support when diagnosing switch behavior.

For details on the commands, refer to the *HP StorageWorks Fabric OS 4.x command reference guide*.

Setting up automatic trace dump transfers

You can set up a switch so that diagnostic information is transferred automatically to a remote server. If a problem then occurs, you can provide your customer support representative with the most detailed information possible. To ensure the best service, you should set up for automatic transfer as part of standard switch configuration, before a problem occurs.

Setting up for automatic transfer of diagnostic files entails the following tasks:

- Specifying a remote server to store the files.
- Enabling the automatic transfer of trace dumps to the server. (Trace dumps overwrite each other by default; sending them to a server preserves information that would otherwise be lost.)

You should also set up a periodic checking of the remote server so that you are alerted if the server becomes unavailable and you can correct the problem. Refer to the *HP StorageWorks Fabric OS 4.x procedures user guide* for additional information.

The following procedures describe in detail the tasks for setting up automatic transfer.

To specify a remote server:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Trace** tab.
3. Enter the FTP host IP address, path of the remote directory in which to store the trace dump files, FTP user name, and FTP password in the appropriate fields. The password is optional if you log in as an anonymous user.
4. Click **Apply**.

To enable automatic transfer of trace dumps:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Trace** tab.
3. Select **Enable** in the Auto FTP Upload section to enable automatic uploading of the trace dump to the FTP host.
4. Click **Apply**.

Disabling automatic trace uploads

If automatic uploading of a trace dump is disabled, you must manually upload the trace dump or else the information is overwritten when a subsequent trace dump is generated.

To disable automatic uploading of the trace dump:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Trace** tab.
3. Select **Disable** in the Auto FTP Upload section to disable automatic uploading of the trace dump to the FTP host.
4. Click **Apply**.

Uploading a trace dump manually

You can manually upload a trace dump when automatic uploading is not enabled. To upload the trace dump:

1. Launch the Switch Admin module as described on page 43.
2. Click the **Trace** tab.

   The Trace Dump Availability section shows whether a trace dump is available. If the Trace Auto FTP Uploaded check box is selected, the trace dump has been automatically uploaded to the FTP host.
3. Select **Upload Trace**. If the Upload Trace button is inactivated, it means that a trace dump is not available.

   The Upload Trace dialog box opens, along with the default trace dump file name.
4. Optional: Enter a new trace dump file name if you want to change it from the default name.
5. For Core Switch 2/64 and SAN Director 2/128, select the CP (active or standby) from which the trace dump is to be uploaded.

   If the CP does not have a trace dump, that CP selection is disabled.

6. Click **OK**.

Creating and maintaining user-defined accounts

In addition to the four default accounts—root, factory, admin, and user—Fabric OS supports up to 15 user-defined accounts in each logical switch (domain). These accounts expand your ability to track account access and audit administrative activities.

The User tab of the Switch Admin module (see Figure 17) displays account information and enables you to create and manage user accounts.

NOTE: If you are operating in secure mode, you can perform these operations only on the primary FCS switch.

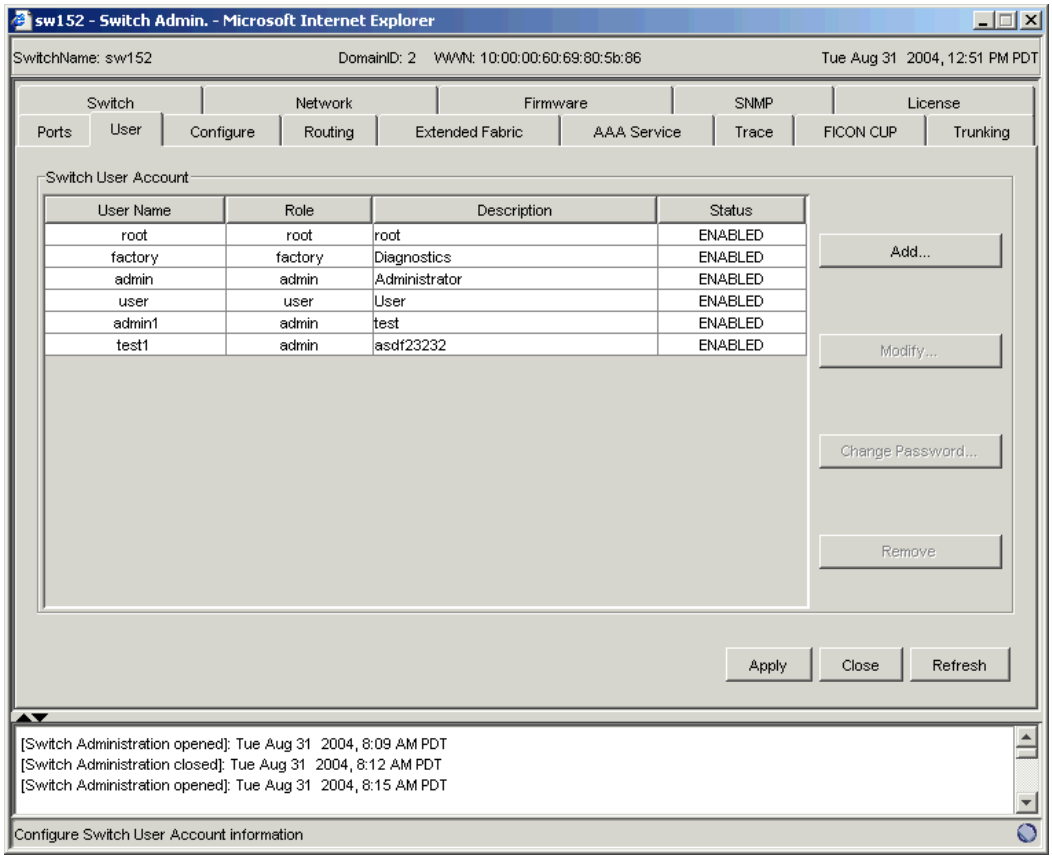


Figure 17 User tab

To display account information:

1. Launch the Switch Admin module as described on page 43.
2. Click the **User** tab.

   A list of the default and user-defined accounts opens.

To create a user-defined account:

1. Launch the Switch Admin module as described on page 43.
2. Click the **User** tab.
3. Click the **Add** button.

The Add User Account dialog box opens.

4. Enter the user name, which must begin with an alphabetic character.

   The name can be up to 40 characters long. It is case sensitive and can contain alphabetic and numeric characters, the dot (.) and the underscore (_). It must be different from all other account names on the logical switch.

5. Select a role from the list: either admin or user in nonsecure mode; admin, user, or nonfcsadmin in secure mode.
6. Optional: Enter a description of the account.
7. Select the **Enabled** or **Disabled** radio button to enable or disable the account.
8. Enter the password for the account.

   Passwords can be from 8 through 40 characters. They must begin with an alphabetic character; they can include numeric characters, the dot (.), and the underscore (_). They are case sensitive and are not displayed when you enter them on the command line.

9. Reenter the password in the Confirm Password field for confirmation.
10. Click **OK**.
11. Click **Apply** to save your changes.

To delete a user-defined account:

1. Launch the Switch Admin module as described on page 43.
2. Click the **User** tab.
3. Select the account to remove.
4. Click the **Remove** button.
5. Click **Apply** to save your changes.

You cannot delete the default accounts. An account cannot delete itself. All active CLI sessions for the deleted account are logged out.

To change account parameters:

1. Launch the Switch Admin module as described on page 43.
2. Click the **User** tab.
3. Select the account to modify.



NOTE: You cannot modify the default root and factory accounts, even if you are logged in as root.

4. Click the **Modify** button.

   The Modify User Account dialog box opens.

   You cannot change the user name of the account. To change the user name, you must delete the account and create a new account.

5. Select a role from the list: either admin or user in nonsecure mode; admin, user, or nonfcsadmin in secure mode.

   You can change the role only on user-level accounts. You cannot change the role on the default accounts. You cannot change the role of your own account.

6. Type a new description.

   You can change the description only on user-level accounts. You cannot change the description of the default accounts. You cannot change the description of your own account.

7. Select the **Enabled** or **Disabled** radio button to enable or disable the account.

   You can enable and disable user- and admin-level accounts except for your own account. You cannot enable or disable your own account or the factory account. Only the root account can disable itself.

   If you disable an account, all active CLI sessions for that account are logged out.

8. Click **OK**.
9. Click **Apply** to save your changes.

To change the password for an admin- or user-level account:

1. Launch the Switch Admin module as described on page 43.
2. Click the **User** tab.
3. Select the account to modify.

   You can change the password of your own account, peer admin accounts, and user accounts. You cannot change the root or factory account passwords.

4. Click the **Change Password** button.

   The Set User Account Password dialog box opens.

   If you are changing the password of an admin account, you must also provide the current password. You do not need to provide the current password if you are changing the password of a lower-level user account.

5. Enter the current password of the account.

   This step is required only if you are changing the password of your own or a peer admin account.

6. Enter the new password of the account.

   The new password must have at least one character different from the old password.

7. Reenter the new password in the Confirm Password field.
8. Click **OK**.
9. Click **Apply** to save your changes.

Configuring SNMP information

This section describes how to manage the configuration of the SNMP agent in the switch. The configuration includes SNMPv1 and SNMPv3 configuration, accessControl, and systemGroup configuration parameters.

For more information, refer to the `snmpConfig` command in the *HP StorageWorks Fabric OS 4.x command reference guide*.

Setting SNMP trap levels

When you set trap levels for the Core Switch 2/64 or SAN Director 2/128 configured with two logical switches, the configuration is on a logical-switch basis. This means that for each logical switch, you must set trap levels individually.

To set trap levels:

1. Launch the Switch Admin module as described on page 43.
2. Click the **SNMP** tab (see Figure 18).

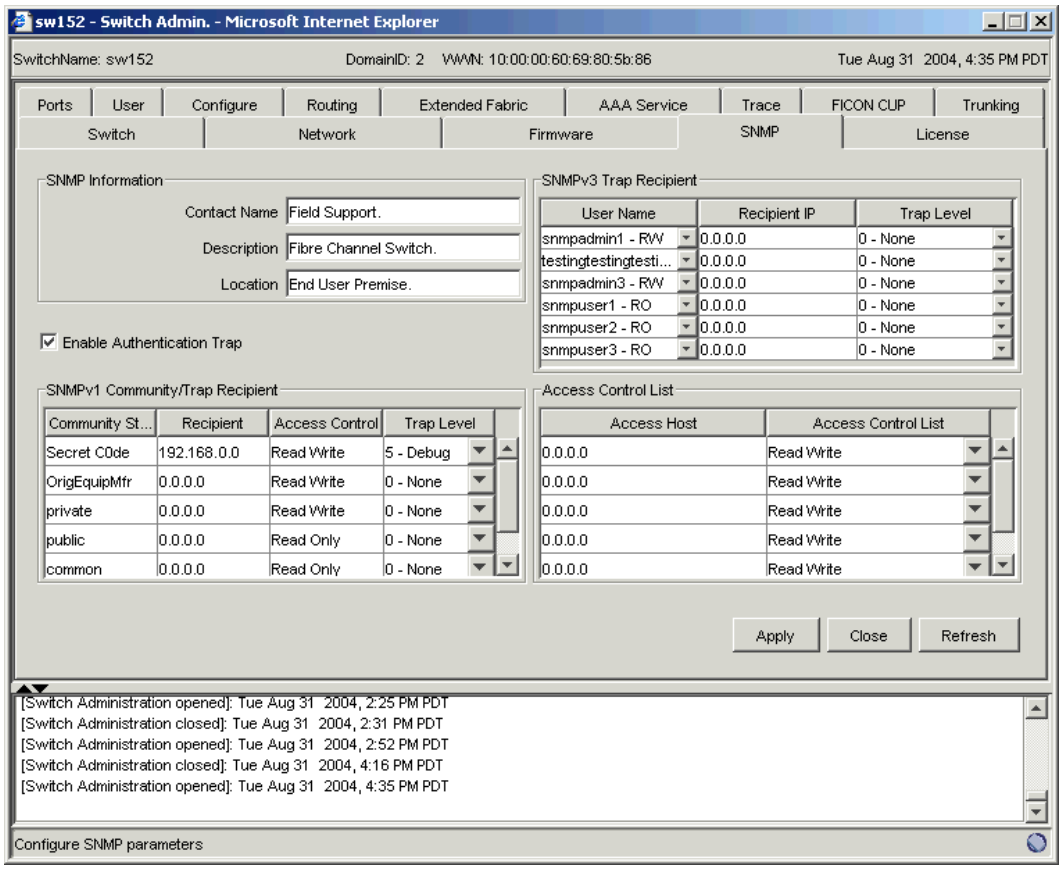


Figure 18 SNMP tab

3. Select a trap level for a recipient from the corresponding Trap Level list in the SNMPv1 and SNMPv3 sections.

   The level you select identifies the minimum event level that will prompt a trap.

4. Click **Apply**.

Configuring SNMP information

When you configure SNMP information for the Core Switch2/64 or SAN Director 2/128 configured with two logical switches, the configuration is on a logical-switch basis. This means that for each logical switch, you must configure SNMP information individually.

To change the systemGroup configuration parameters:

1. Launch the Switch Admin module as described on page 43.
2. Click the **SNMP** tab (see Figure 18).
3. Enter a contact name, a description, and a location in the SNMP Information section.
4. Optional: select the **Enable Authentication Trap** check box to allow authentication traps to be sent to the reception IP address.
5. Click **Apply**.

To set SNMPv1 configuration parameters:

1. Launch the Switch Admin module as described on page 43.
2. Click the **SNMP** tab (see Figure 18 on page 72).
3. Double-click a community string in the SNMPv1 section and enter a new community string.
4. Double-click a recipient IP address in the SNMPv1 section and enter a new IP address.
5. Click **Apply**.

To set SNMPv3 configuration parameters:

1. Launch the Switch Admin module as described on page 43.
2. Click the **SNMP** tab (see Figure 18 on page 72).
3. Select a user name from the User Name list in the SNMPv3 section.
4. Double-click a recipient IP address in the SNMPv3 section and enter a new IP address.
5. Select a trap level from the Trap Level list.
6. Click **Apply**.

To change the accessControl configuration:

1. Launch the Switch Admin module as described on page 43.
2. Click the **SNMP** tab (see Figure 18 on page 72).
3. Double-click an access host IP address in the Access Control List section and enter a new host IP address.
4. Select a permission for the host from the Access Control L list. Options are **Read Only** and **Read Write**.
5. Click **Apply**.

Administering high availability

The procedures in this section apply only to the Core Switch 2/64 and SAN Director 2/128; the Hi Availability module is available only on these switches.

Launching the Hi Availability module

The background color of the Hi Avail button indicates the overall status of the switch. The Hi Avail module displays information about the status of the High Availability (HA) feature on the Core Switch 2/62 and SAN Director 2/128 and each CP. It also enables you to perform tasks such as CP failover or synchronizing services on the CPs.

To launch the Hi Avail module:

1. Select a Core Switch 2/64 or SAN Director 2/128 from the Fabric Tree.

   The selected director appears in the Switch View.
2. Click the **Hi Avail** button 

from the Switch View.

   The login dialog box opens.
3. Enter the user name of an account with the admin role.

4. Enter the password.

   The HA Admin module opens, as shown in Figure 19.

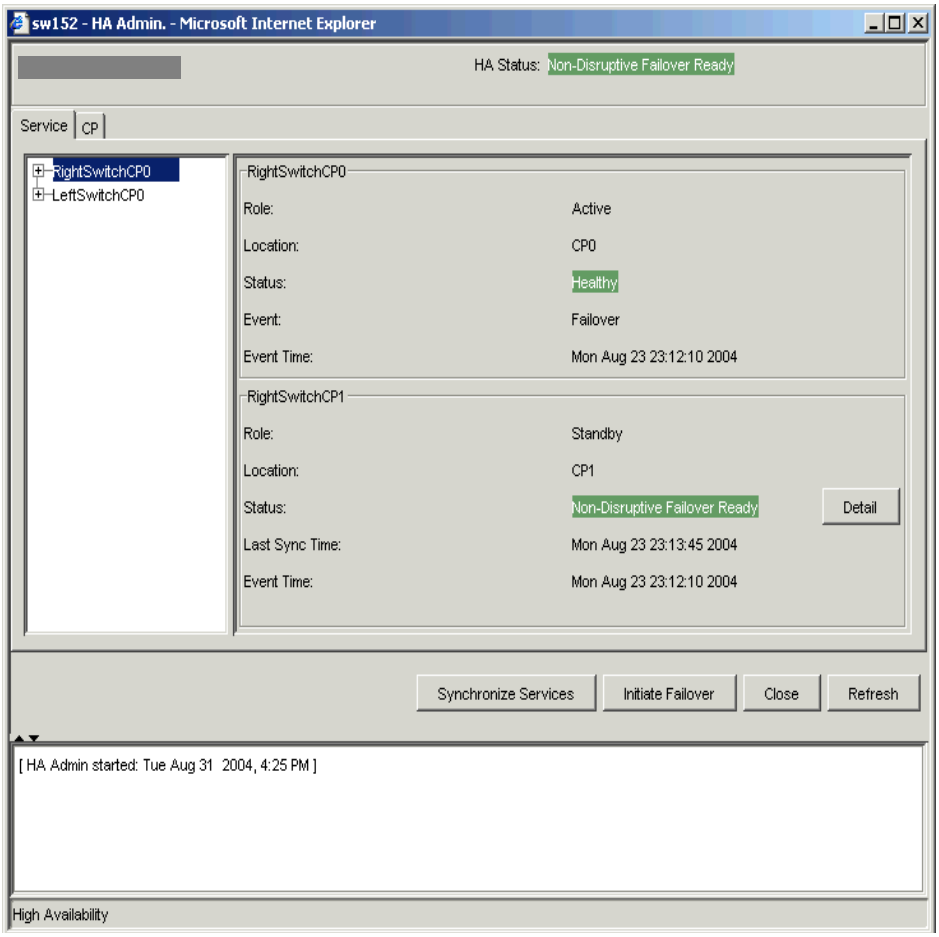


Figure 19 HA Admin module for the Core Switch 2/64

NOTE: There is a background color with the HA Status for each CP. The HA Admin module is not refreshed automatically. Click **Refresh** to update the information displayed in the HA Admin module.

Synchronizing services on the CP

A nondisruptive CP failover is possible only when all the services on it have been synchronized.

To synchronize the services:

1. Launch the Hi Avail module as described in "Launching the Hi Availability module" on page 73.
2. If the HA Status field displays `Non-Disruptive Failover Ready`, you are finished.

   If the HA Status field displays `Disruptive Failover Ready`, continue with step 3.
3. Click the **Synchronize Services** button.

   The Warning dialog box opens.
4. Click **Yes** and wait for the CPs to complete a synchronization of services, so that a nondisruptive failover is ready.
5. Click **Refresh** to update the HA Status field.

When the HA Status field displays `Non-Disruptive Failover Ready`, a failover can be initiated without disrupting frame traffic on the fabric.

Initiating a CP failover

A nondisruptive failover might take a few minutes to complete. You may lose connection to the switch for a few minutes during the failover; however, Advanced Web Tools automatically resumes the connection after the failover.

To initiate a CP failover:

1. Launch the Hi Avail module as described in "Launching the Hi Availability module" on page 73.
2. Verify that the HA Status field displays `Non-Disruptive Failover Ready or Disruptive Failover Ready`. See "Synchronizing services on the CP" on page 74 for more information.
3. Click **Initiate Failover**.

   The Warning dialog box opens.
4. Click **Yes** to initiate a non-disruptive failover.

Managing a RADIUS server

Fabric OS supports RADIUS authentication, authorization, and accounting service (AAA). When configured for RADIUS, the switch becomes a Network Access Server (NAS) that acts as a RADIUS client. In this configuration, authentication records are stored in the RADIUS host server database. Login and logout account name, assigned role, and time accounting records are also stored on the RADIUS server.

Set up RADIUS service through a secure connection, such as SSH. Use the AAA Service tab of the Switch Admin module to manage the RADIUS server (see Figure 20).

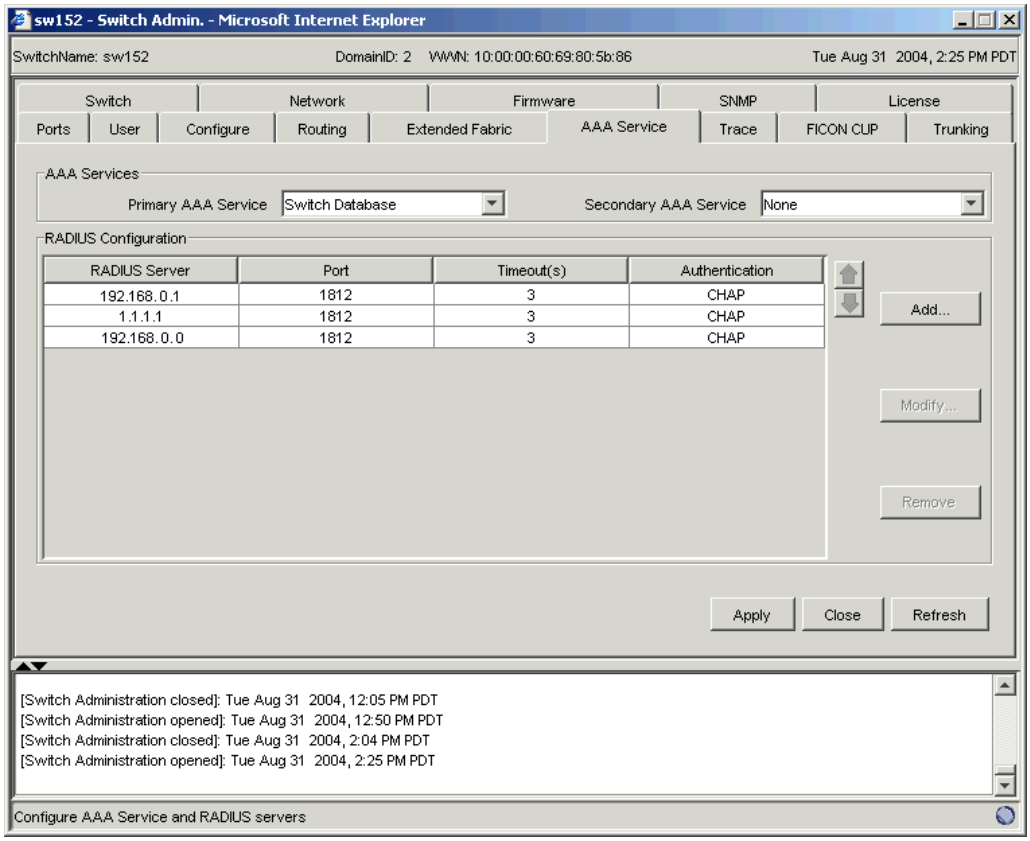


Figure 20 AAA Service tab

Enabling and disabling RADIUS service

At least one RADIUS server must be configured before you can enable RADIUS service.

To enable or disable RADIUS service:

1. Launch the Switch Admin module as described on page 43.
2. Click the **AAA Service** tab.
3. To enable RADIUS service, select a RADIUS service from the Primary AAA Service list and then select **None** or **Switch Database** from the Secondary AAA Service list.

   To disable RADIUS service, select **Switch Database** from the Primary AAA Service list and select **None** from the Secondary AAA Service list.
4. Click **Apply**.

Configuring the RADIUS server

The configuration is chassis-based, so it applies to all logical switches (domains) on the switch and replicates itself on a standby CP if one is present. It is saved in a configuration upload, so it can be applied to other switches in a configuration download. You should configure at least two RADIUS servers so that if one fails, the other will assume service.

You can configure the RADIUS server even if it is disabled. You can configure up to five RADIUS servers; you must be logged in as admin to configure the RADIUS server.

To configure the RADIUS server:

1. Launch the Switch Admin module as described on page 43.
2. Click the **AAA Service** tab.
3. Click **Add**.

   You can configure up to five RADIUS servers. If five RADIUS servers are already configured, the Add button is disabled.

   The RADIUS Configuration dialog box opens.
4. Enter the RADIUS server name, which is a valid IP address or Dynamic Name Server (DNS) string.

   Each RADIUS server must have a unique IP address or DNS name for the RADIUS server.
5. Optional: Enter the port number.
6. Optional: Enter the secret string.
7. Optional: Enter the time-out time in minutes.
8. Optional: Select an authentication protocol from CHAP or PAP.

   The default value is CHAP, and if you do not change it, CHAP will be the authentication protocol.
9. Click **OK** to return to the **AAA Service** tab.
10. Click **Apply**.

Modifying the RADIUS server

Use the following procedure to change the parameters of a RADIUS server that is already configured.

To modify the RADIUS server:

1. Launch the Switch Admin module as described on page 43.
2. Click the **AAA Service** tab.
3. Select a RADIUS server from the RADIUS Configuration list.
4. Click **Modify**.

   The RADIUS Configuration dialog box opens.
5. Enter new values for the port number, secret string, and time-out time (in minutes).
6. Select an authentication protocol from CHAP or PAP.

   The default value is CHAP, and if you do not change it, CHAP will be the authentication protocol.
7. Click **OK** to return to the AAA Service tab.
8. Click **Apply**.

Modifying the RADIUS server order

The RADIUS servers are contacted in the order they are listed, starting from the top of the list. To modify the order in which the RADIUS servers are contacted:

1. Launch the Switch Admin module as described on page 43.
2. Click the **AAA Service** tab.
3. Select a RADIUS server from the RADIUS Configuration list.
4. Click the up and down arrows to rearrange the order of the RADIUS servers.
5. Click **Apply**.

Removing a RADIUS server

Use the following procedure to remove a RADIUS server:

1. Launch the Switch Admin module as described on page 43.
2. Click the **AAA Service** tab.
3. Select a RADIUS server from the RADIUS Configuration list.
4. Click **Remove**.

   If there is no RADIUS server configured, the Remove button is disabled. You cannot remove the only RADIUS server if the RADIUS service is the primary AAA service.

   The RADIUS server is not deleted until you apply the changes from the AAA Services tab.
5. Click **Apply** in the AAA Services tab.

   A confirmation appears, warning you that you are about to remove the selected RADIUS server.
6. Click **Yes** in the confirmation.

4 Monitoring your fabrics, switches, and ports

This chapter contains the following sections:

- Monitoring events, page 79
- Displaying a fabric topology report, page 84
- Displaying the name server entries, page 85
- Displaying switch information, page 87
- Physically locating a switch using beaconing, page 90
- Displaying port information, page 90
- Displaying swapped port area IDs, page 92

Monitoring events

Advanced Web Tools displays fabric-wide and switch-wide events. Event information includes sortable fields for the following:

- Switch name
- Message number
- Time stamp
- Indication whether the event is from a logical switch or a chassis
- Severity level
- Unique message identifier (in the form *moduleID-messageType*)
- Detailed error message for root cause analysis

There are four message severity levels: Critical, Error, Warning, and Info. Table 7 lists the event message severity levels displayed in the Switch Event and Fabric Events views, and describes the characteristics of each level.

In both the Switch Events view and the Fabric Events view, you can click the **Filter** button to open the Filter Events dialog box. The Filter Events dialog box allows you to define which events should be displayed in the Switch Events view or Fabric Events view. For more information on filtering events, refer to "Filtering fabric and switch events" on page 82.

Table 7 Event security levels

Icon and level	Description
Critical (0)	Critical-level messages indicate that the software has detected serious problems that will cause a partial or complete failure of a subsystem if not corrected immediately; a power supply failure or rise in temperature, for example, must receive immediate attention.
Error (1)	Error-level messages indicate a condition that does not significantly affect overall system functionality. For example, error-level messages may indicate time-outs on certain operations, failures of certain operations after retries, invalid parameters, or failure to perform a requested operation.
Warning (2)	Warning-level messages indicate a current operating condition that should be checked before it could lead to a failure. For example, a power supply failure in a redundant system relays a warning that the system is no longer operating in redundant mode and that the failed power supply needs to be replaced or fixed.
Info (4)	Information-level messages report the current non-error status of system components; for example, the online and offline status of a fabric port.

Displaying fabric events

Events are displayed for all switches in the fabric in the Fabric Events view (see Figure 21). Fabric Events are not automatically polled. You must click **Refresh** from the Fabric Events view to poll fabric events. Switch events are automatically polled every 15 seconds.

Fabric Events can be collected only for switches that have the same security level (http or https) as the launch switch. For switches that have a different level of security from the launch switch, a message is displayed at the top of the window that indicates how many switches have no events reported from the last polling. For detailed information on the switch names and reasons for not polling (if available), click **Details**.

To display fabric events:

1. Click a fabric from the Fabric Tree.
2. Click the **Fabric Events** icon on the Fabric Toolbar.

   The Fabric Events window opens (see Figure 21).
3. Optional: Click the column head to sort the events by that column. Drag the column divider to resize a column.

You can also filter switch events, as described in "Filtering fabric and switch events" on page 82.

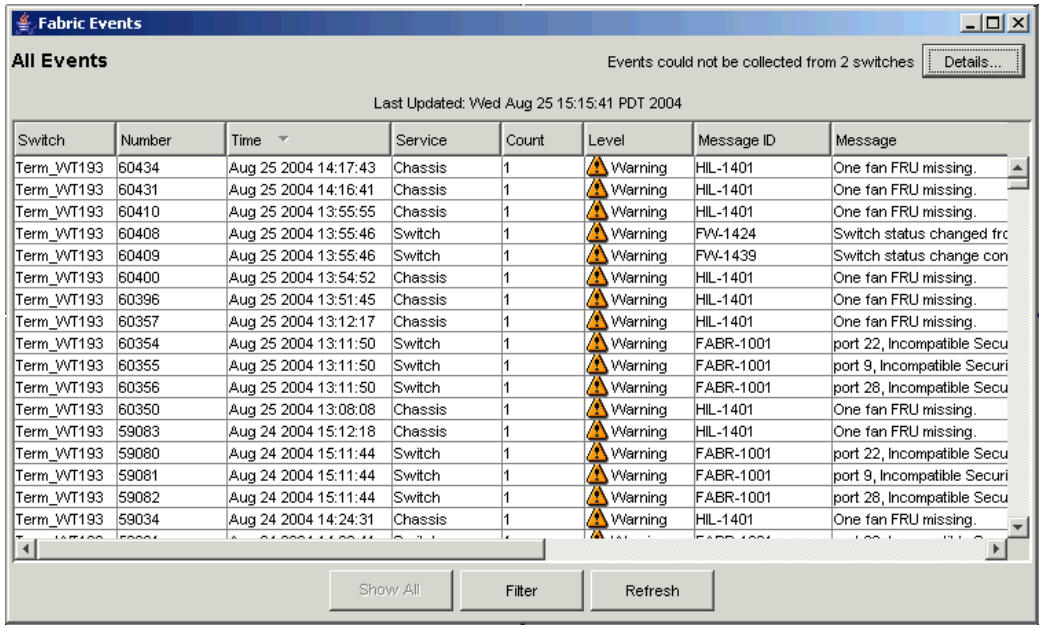


Figure 21 Fabric Events view

Displaying switch events

The Switch Events window displays a running log of events for the selected switch (see Figure 22). Switch events are polled and updated every 15 seconds, so there is no refresh-on-demand option for switch events as there is for the fabric events.

NOTE: For two-switch configurations, all chassis-related events are displayed in the event list of each logical switch for convenience.

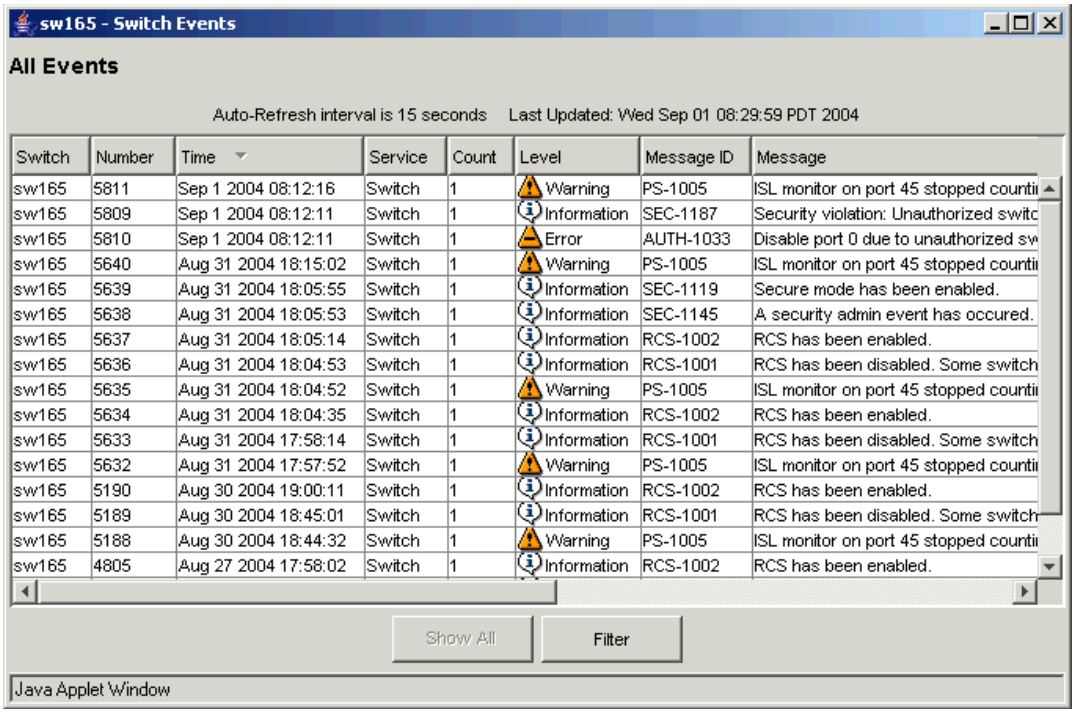


Figure 22 Switch Events view

To display switch events:

1. Click the switch from the Fabric Tree.

   The Switch View opens.

2. Click the **Events** button 

from the Switch View.

   The Switch Events window opens (see Figure 22).

3. Optional: Click the column head to sort the events by that column. Drag the column divider to resize a column.

You can also filter switch events, as described in "Filtering fabric and switch events".

Filtering fabric and switch events

You can filter the events in the Fabric Events window and Switch Events window by time, severity, message ID, and service. You can apply either one type of filter at a time or multiple types of filters at the same time. The Switch Event and Fabric Event views both have a Filter button. Click the **Filter** button to open the Filter Events dialog box (see Figure 23).

When a filter is applied, the Show All button is active in the events views and the type of filter applied is identified at the top of the events views (see Figure 22). To un-apply a filter, click the **Show All** button in the events window.

NOTE: For two-switch configurations, clicking the Events button for a given switch automatically filters out switch service events from the other switch. Chassis service is shown in both events lists.

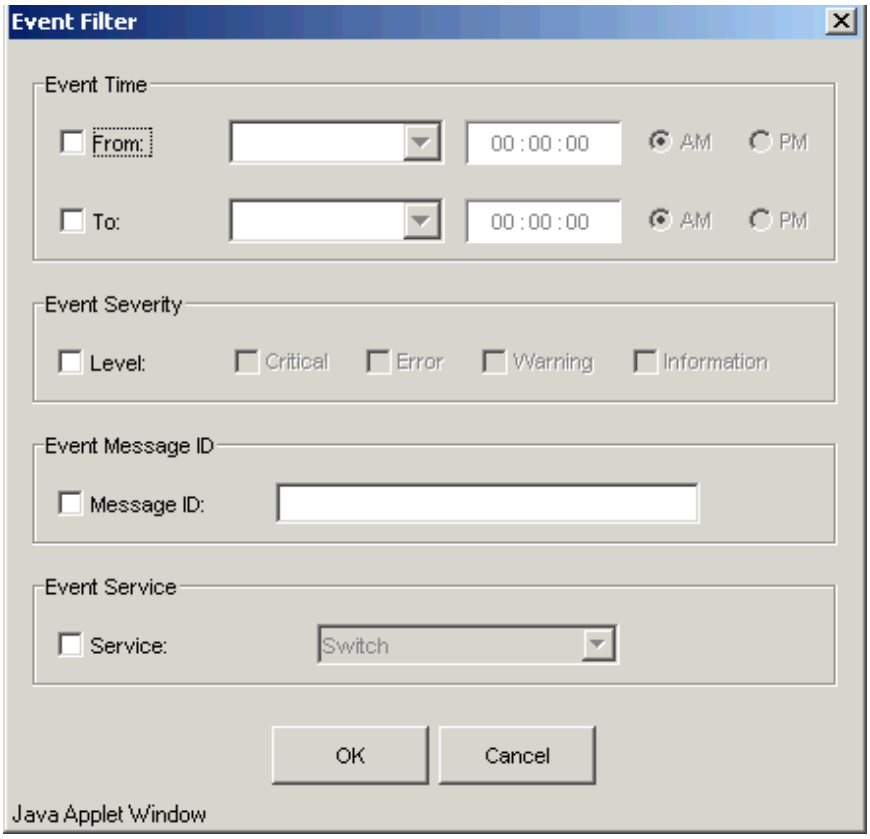


Figure 23 Event Filter dialog box

To filter events by time intervals:

1. Launch the Fabric Events or Switch Events view as described in "Displaying fabric events" on page 80 or "Displaying switch events" on page 81.
2. Click **Filter**.

   The Event Filter dialog box opens.
3. To filter events within a certain time period:
   a. Select **From** and enter the start time and date in the fields.
   b. Select **To** and enter the finish time and date in the fields.
4. To filter all events beginning at a certain date and time, select **From** and enter the start time and date in the fields.
5. To filter events up until a certain date and time, select **To** and enter the finish time and date in the fields.
6. Click **OK**.

The filter is enabled and the enabled filter type is displayed in the events window.

To filter events by event severity levels:

1. Launch the Fabric Events or Switch Events view as described in "Displaying fabric events" on page 80 or "Displaying switch events" on page 81.
2. Click **Filter**.

   The Event Filter dialog box opens.

3. Select **Level**.

   The event severity level check boxes are enabled.

4. Click the event levels you want to display.
5. Click **OK**.

The filter is enabled and the enabled filter type is displayed in the events window.

To filter events by message ID:

1. Launch the Fabric Events or Switch Events view as described in "Displaying fabric events" on page 80 or "Displaying switch events" on page 81.
2. Click **Filter**.

   The Event Filter dialog box opens.

3. Select **Message ID**.
4. Enter the message IDs in the associated field.

   You can enter multiple message IDs separated by commas. You can enter either the full message ID (*moduleID-messageType*) or a partial ID (*moduleID* only).

5. Click **OK**.

The filter is enabled and the enabled filter type is displayed in the events window.

To filter events by service component:

1. Launch the Fabric or Switch Events view as described in "Displaying fabric events" on page 80 or "Displaying switch events" on page 81.
2. Click **Filter**.

   The Event Filter dialog box opens.

3. Select **Event Service**.

   The event service list is enabled.

4. Select either **Switch** or **Chassis** from the list to show only those messages from the logical switch or from the chassis.
5. Click **OK**.

The filter is enabled and the enabled filter type is displayed in the events window.

Displaying a fabric topology report

A fabric topology report lists all the domains in the fabric and the active paths for each domain. A sample fabric topology report is shown in Figure 24.

To view a fabric topology report:

1. Click the **Fabric Topology** icon  on the Fabric Toolbar.

   The Fabric Topology window opens.

2. Click the **Print** button to print a topology report.

   A Print button is located at the top and bottom of the report. Both Print buttons have the same function.

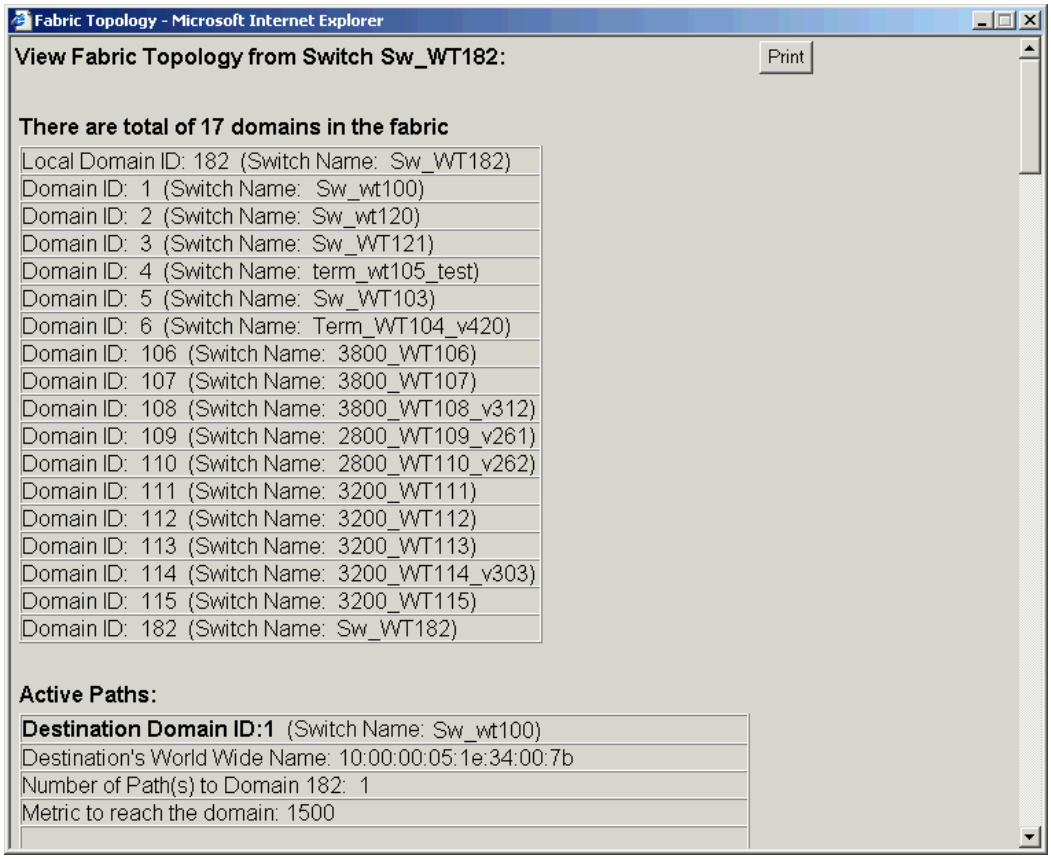


Figure 24 Fabric topology report

Displaying the name server entries

Advanced Web Tools displays Name Server entries listed in the Simple Name Server database (see Figure 25). This includes all Name Server entries for the fabric, not only those related to the local domain. Each row in the table represents a different device.

NOTE: Name Server entries are not automatically polled by default. You must click **Refresh** from the Name Server view to poll Name Server entries. You can also specify a time interval at which the Name Server entries are to be automatically refreshed.

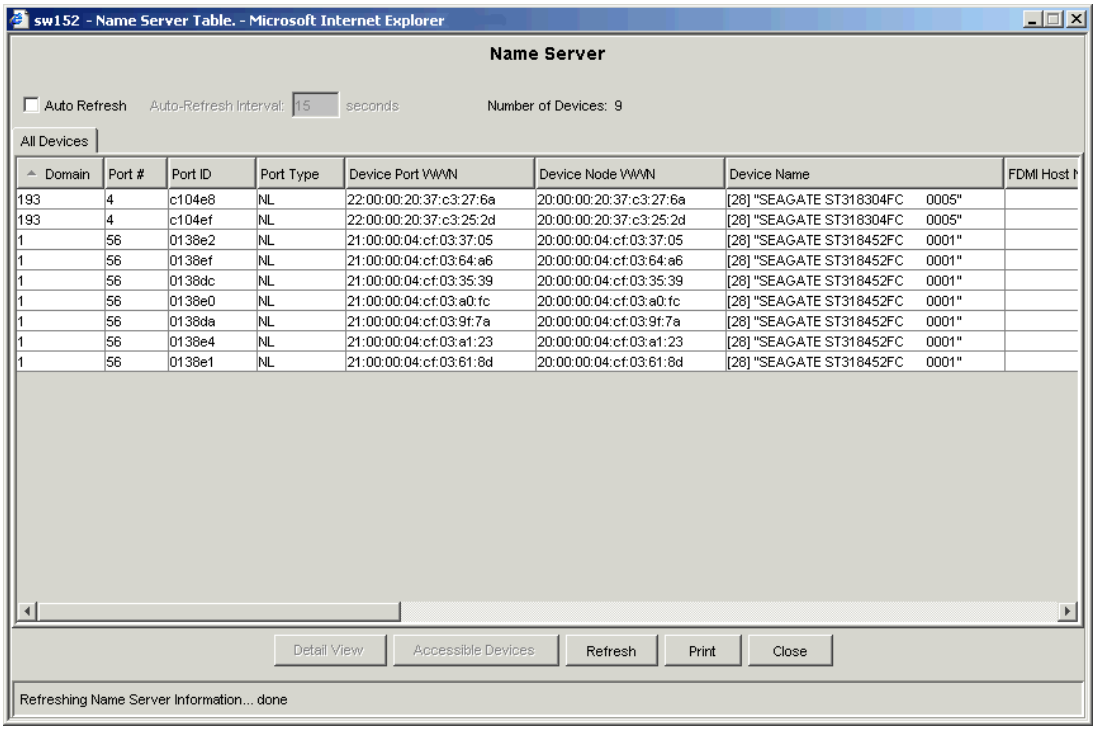


Figure 25 Name Server view

To view a list of the switches in the Name Server:

1. Click the **Name Server** icon from the Fabric Toolbar.
   The Name Server Table opens.
2. Optional: Click the **Auto Refresh** check box from the Name Server view.
3. Optional: Enter an autorefresh interval (in seconds), with a minimum of 15 seconds.
   The Name Server entries refresh at the rate you set.

To print the Name Server entries:

1. Click the **Name Server** icon from the Fabric Toolbar.
   The Name Server Table opens.
2. Click **Print**.
   The Page Setup dialog box opens. Make changes, as appropriate.
3. Click **OK** in the Page Setup dialog box.
   The Print dialog box opens.
4. Select a printer and click **OK** in the Print dialog box.

To display detailed Name Server information for a particular device:

1. Click the **Name Server** icon from the Fabric Toolbar.
   The Name Server Table opens.
2. Select a device from the Domain column.

3. Click **Detail View**.

The Name Server Information dialog box opens and displays information specific to that device.

To display the zone members of a particular device:

1. Click the **Name Server** icon  from the Fabric Toolbar.

   The Name Server Table opens.

2. Select a device from the Domain column.
3. Click **Accessible Devices**.

The Zone Accessible Devices view displays accessible zone member information specific to that device.

Displaying switch information

This section describes how to display information about the physical components of the switch (such as fan, temperature, and power supply) as well as how to display other detailed switch information (such as firmware and IP address).

Displaying detailed fan hardware status

The background color of the Fan button indicates the overall status of the fans. For more information about the switch fan, refer to the appropriate hardware documentation.

Note that the Fan No. column indicates either the fan number or the fan FRU number, depending on the switch model. A fan FRU can contain one or more fans.

- For the Core Switch 2/64, SAN Director 2/128, and SAN Switch 4/32, the Fan No. column shows the fan FRU number.
- For the SAN Switch 2/32, the Fan No. column shows the fan number.
- The SAN Switch 2/8V and SAN Switch 2/16V do not contain fan FRUs, so for these switch models, the **Fan No.** column shows the fan number.

To display the fan status detail:

1. Select a switch from the Fabric Toolbar.

   The selected switch appears in the Switch View. The background color of the **Fan** button indicates the overall status of the fan.

2. Click the **Fan** button 

from the Switch View.

The detailed fan status for the switch is displayed.

Displaying the temperature status

The background color of the Temp button indicates the overall status of the temperature. For more information regarding switch temperature, refer to the appropriate hardware documentation.

To display the temperature status detail:

1. Select a switch from the Fabric Toolbar.

   The selected switch appears in the Switch view. The background color of the Temp button indicates the overall status of the temperature.

2. Click the **Temp** button 

from the Switch View.

The detailed temperature sensor states for the switch are displayed.

Displaying the power supply status

The background color of the Power button indicates the overall status of the power supply. For more information regarding switch power modules, refer to the appropriate hardware documentation.

To display the power supply status detail:

1. Select a switch from the Fabric Tree.

   The selected switch appears in the Switch View. The background color of the Power button indicates the overall status of the power supply.

2. Click the **Power** button 

from the Switch View.

The detailed power supply states are displayed for the switch.

Checking the physical health of a switch

The Status button 

displays the operational state of the switch. The background color of the button displays the real-time status of the switch. See the Status Legend for the meaning of the background colors.

If no data is available from a switch, the most recent background color remains displayed. For all statuses that are based on errors-per-time-interval, any errors cause the status to show faulty until the entire sample interval has passed.

If the switch status is marginal or critical, information on the trigger that caused that status is displayed in the Switch Information view. Click the **Status** button to display a detailed, customizable switch status report, as shown in Figure 26.

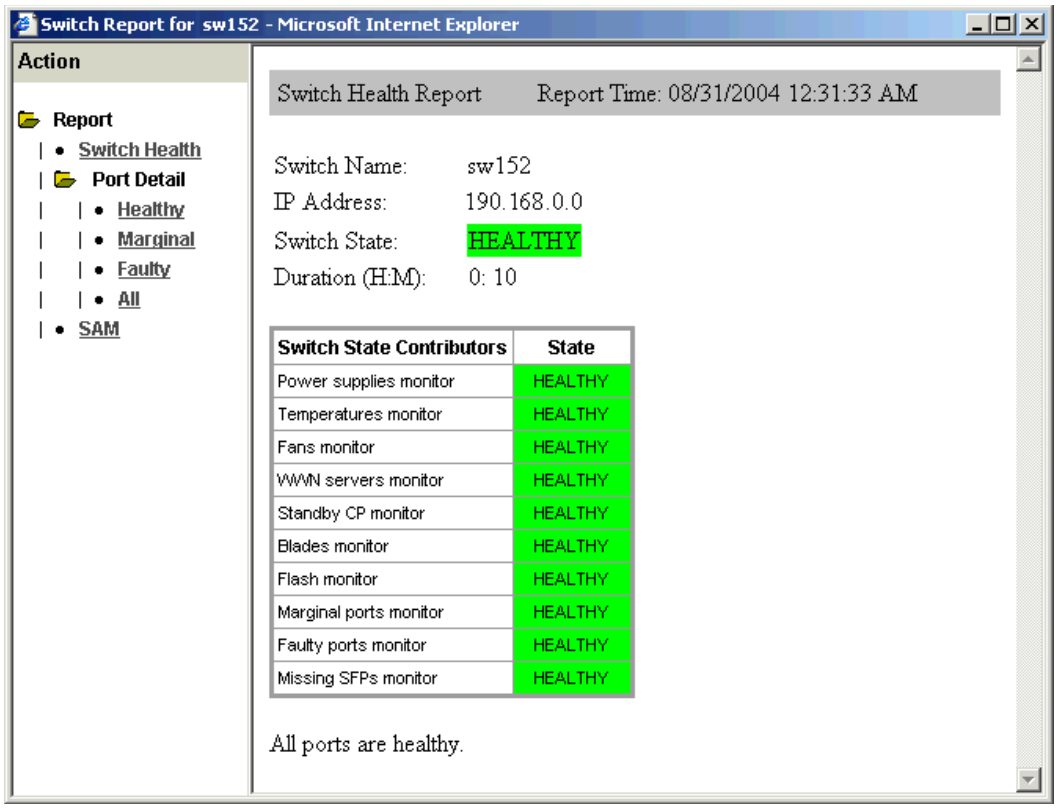


Figure 26 Switch status report

To display a detailed switch status report:

1. Select a switch from the Fabric Tree.

The selected switch appears in the Switch View. The background color of the Status button indicates the overall status of the switch.

2. Click the **Status** button 

from the Switch View.

   The detailed switch health report is displayed, as shown in Figure 26.

3. Optional: Click the underlined links in the left panel to display detailed information about ports and Switch Availability Monitoring (SAM).
4. Optional: Mouse-over the Action field (see Figure 27) and click an action to do any of the following:
   - Refresh the information displayed in the report.
   - Customize the report.
   - View the data in raw XML format.
   - View the style sheet for the report.
   - View the XML schema for the report.

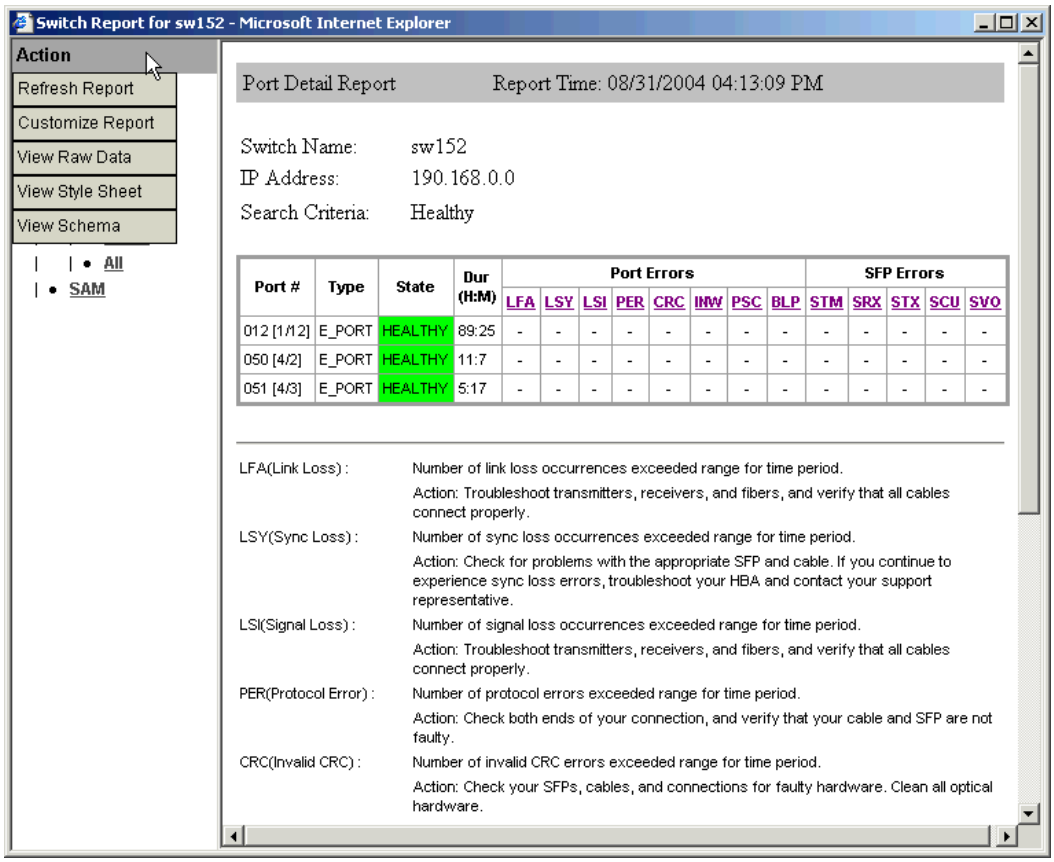


Figure 27 Switch report action menu

Displaying detailed switch information

The Info button in the Switch View displays detailed switch information, as shown in Figure 28.

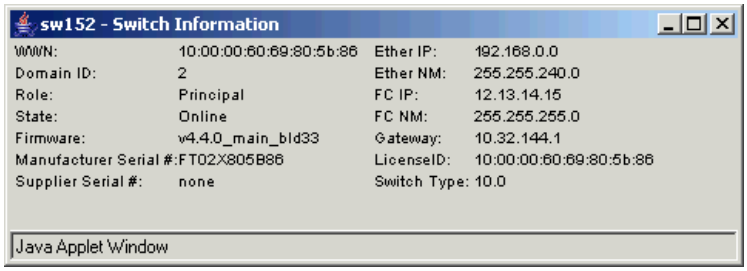


Figure 28 Switch information view

To display detailed switch information:

1. Select a switch from the Fabric Tree.

   The selected switch appears in the Switch View.

2. Click the **Info** button 

.

The Switch Information view is displayed.

Physically locating a switch using beaconing

Use the Beacon button to physically locate a switch in a fabric. The beaconing function helps to physically locate a switch by initiating a LED light pattern that cycles through all ports for each switch (from left to right).

To enable beaconing:

1. Select a switch from the Fabric Tree.

   The selected switch appears in the Switch View.

2. Click the **Beacon** button 

on the Switch View.

   The LEDs on the switch (selected in the GUI) light up in a pattern running back and forth across the switch itself. The beaconing is not shown in the GUI.

3. Observe the physical switches to locate the beaconing switch.

Displaying port information

The Switch View displays port graphics with blinking LEDs, simulating the physical appearance of the ports. One of the LEDs indicates port status; the other indicates port speed. For LED information, refer to the hardware installation guide for the switch you are viewing.

The background color of the port icon indicates the port status, as follows:

- Green for healthy
- Yellow for marginal
- Red for critical
- Gray for unmonitored

If the entire port icon is blue, the port is buffer-limited. If a group of port icons is grayed out, those ports are not licensed. The port status is also indicated in the Port Information screen in the Port Health field for the selected port. Figure 29 shows a port icon and associated LEDs from a Core Switch 2/64.

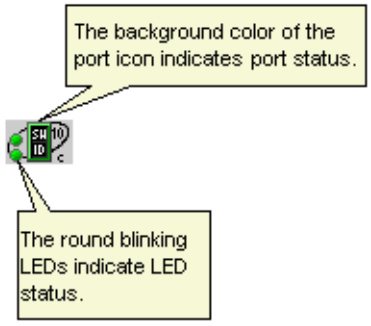


Figure 29 Port and LED status color-coded information

The Port Information screen displays statistics and status for the selected port, SFP, or loop, as shown in Figure 30. Access the Port Information screen by clicking any of the ports in the Switch View.

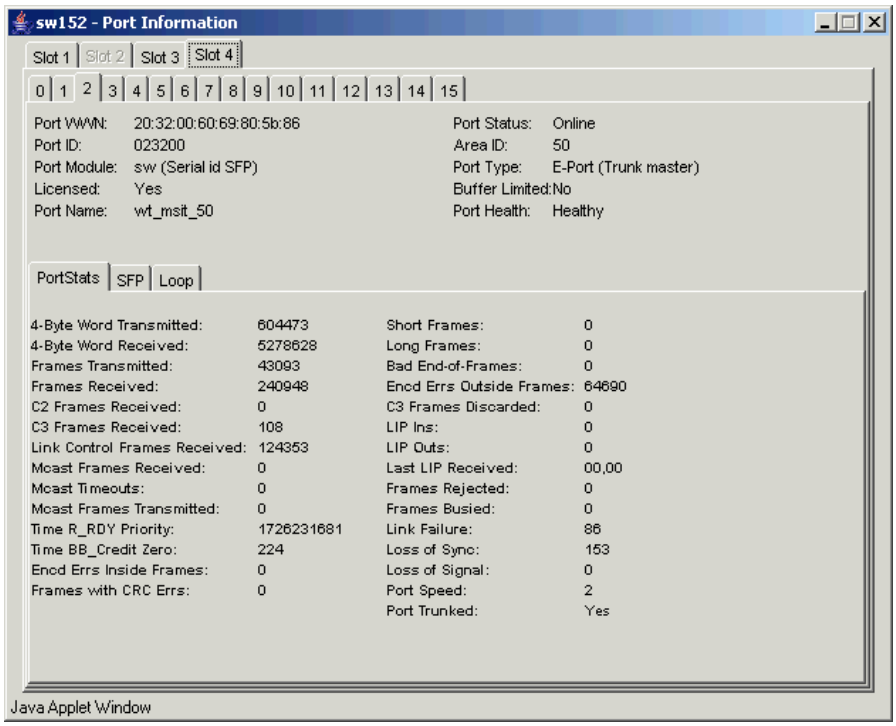


Figure 30 Port Information screen

The number of slots displayed in the Port Information screen depends on the model of switch the port is on.

For example, each logical switch in the Core Switch 2/64 (and the SAN Director 2/128, if it is configured for two logical switches) has four slots. For these switch types, a subtab is displayed for each physically inserted and powered-on slot in the Port Information screen. You must first click the slot tab and then the port tab for that slot.

For the HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, there are no subtabs for the slots. There is just a port tab for each port.

To access the Port Information screen:

1. Select a switch from the Fabric Tree.

   The selected switch appears in the Switch view.

2. Click the port icon for which you want to view information.

   The Port Information screen opens.

3. This step is switch-specific:

   For the Core Switch 2/64 and SAN Director 2/128, click the slot tab that corresponds to the correct slot for the logical switch.

   For the HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, proceed directly to the next step.

4. Click the port tab.
5. Optional: To view additional port information, click one of the subtabs for each port: **PortStats**, **SFP**, or **Loop**.

Displaying swapped port area IDs

Use this procedure to view swapped ports on the switch. You cannot swap ports using Advanced Web Tools: you can swap ports using the Fabric OS CLI only.

To determine whether a port area ID has been swapped with another switch port:

1. Launch the Switch Admin module as described in "Launching the Switch Admin module" on page 43.
2. Click the **Ports** tab.
3. View the Port (Area ID) column in the Port Settings tab.

   For ports that have been swapped, the port number is followed by the area ID, in parentheses.

5 Zone administration

This chapter briefly describes zoning and provides the procedures for managing zoning using Advanced Web Tools. This chapter contains the following sections:

- Introduction to zoning, page 93
- Managing zoning with Advanced Web Tools, page 93
- Managing zone aliases, page 98
- Managing zones, page 99
- Managing QuickLoops, page 101
- Managing Fabric Assist zones, page 102
- Managing zoning configurations, page 104
- Managing the zoning database, page 110

Introduction to zoning

Zoning enables you to partition your storage area network (SAN) into logical groups of devices that can access each other. For example, you can partition your SAN into two zones, winzone and unixzone, so that your Windows servers and storage do not interact with your UNIX® servers and storage.

Zones can be configured dynamically. They can vary in size, depending on the number of fabric-connected devices, and devices can belong to more than one zone. Because zone members can access only other members of the same zone, a device not included in a zone is not available to members of that zone.

When using a mixed fabric—that is, a fabric containing v4.x, v3.x and v2.x switches—you should use the most advanced switches to perform zoning tasks.

When zone or Fabric Assist (FA) zone members are specified by fabric location (domain, area) only, or by device name (node name or port WWN) only, zone boundaries can be enforced at the hardware level and the zone is called a *hard zone*.

When zone elements are specified by fabric location (domain, area) and other elements of the same zone are specified by device name (node name or port WWN), zone enforcement depends on Name Server lookups, and the zone is called a *soft zone*.

For more specific information about zoning concepts, refer to the *HP StorageWorks Secure Fabric OS user guide*.

Managing zoning with Advanced Web Tools

You can monitor and manage zoning through the Zone Admin module. Click the **Zone Administration** icon in the Fabric Toolbar to access the Zone Admin module shown in Figure 31. The Zone Admin icon is displayed in the Fabric Toolbar only if an Advanced Zoning license is installed on the switch.

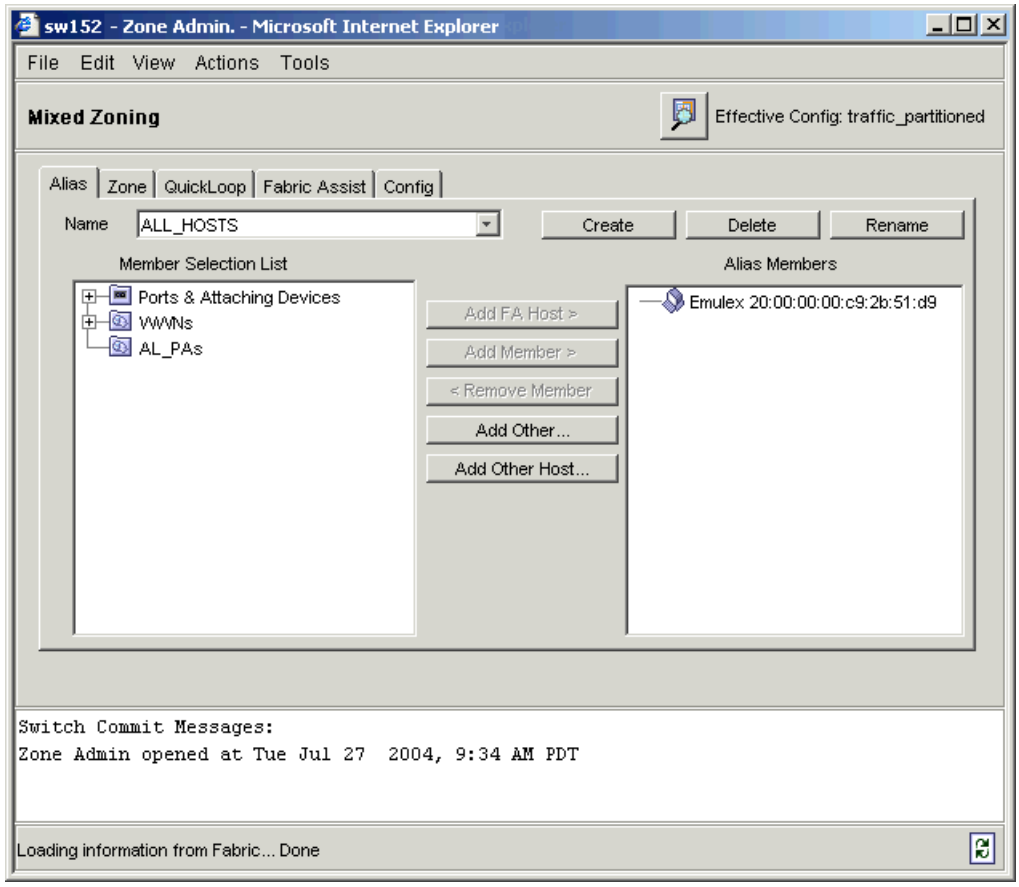


Figure 31 Zone Admin module

The information in the Zone Admin module is collected from the selected switch.

If secure mode is enabled, zoning can be administered only from the primary FCS switch. If the selected switch has an Advanced Zoning license installed, but is not the primary FCS switch, the Zone Admin icon is displayed in the Fabric Toolbar but not activated. For specific information regarding secure fabrics, refer to the *HP StorageWorks Secure Fabric OS user guide*.

When you click the Zone Admin icon from the Fabric Toolbar, you must log in as an admin user to launch the Zone Admin module. A snapshot is taken of all the zoning configurations at the time you launch the Zone Admin module; this information is *not* updated automatically by Advanced Web Tools. To update this information, see "Refreshing the Zone Admin module information" on page 96.

CAUTION: Any changes you make in the Zone Admin module are held in a buffered environment and do not update the zoning database until you save the changes. If you close the Zone Admin module without saving your changes, your changes are lost. To save the buffered changes you make in the Zone Admin module to the zoning database on the switch, see "Saving local zoning changes" on page 96.

Saving means updating the zoning database on the switch with the local changes from the Advanced Web Tools buffer. *Refreshing* means copying the current state of the zoning database on the switch to the Advanced Web Tools buffer, overwriting its current contents.

In the Zone Admin module, all WWNs also display vendor names. In the Member Selection List panel (Figure 31), you can right-click port and device nodes to display which aliases the port or device is a member of. You can also right-click the device nodes and select **View Device Detail** to display detailed information about the selected device, as shown in Figure 32.

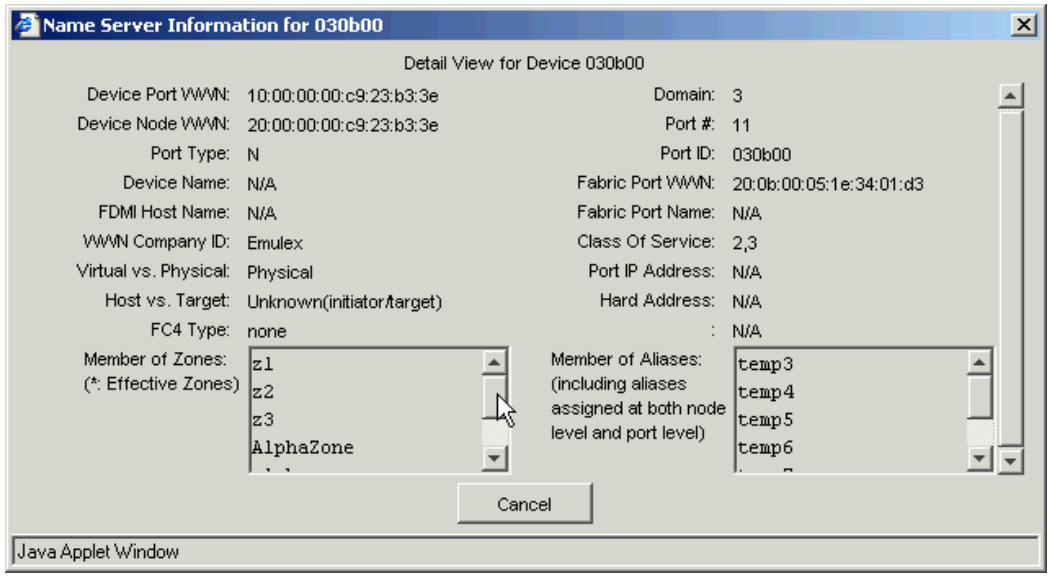


Figure 32 Device Detail view example

NOTE: In the Device Detail view, the scroll bars in the Member of Zones and Member of Aliases sections do not scroll unless you double-click them first.

The remainder of this section describes basic zoning procedures you can perform in the Zone Admin module that are useful for all zoning operations.

Launching the Zone Admin module

This section describes how to launch the Zone Admin module, from which all zoning procedures are performed. To launch the Zone Admin module:

1. Select a switch from the Fabric Tree.

   The selected switch appears in the Switch View.

2. Click the **Zone Administration** icon in the Fabric Toolbar.

   The login dialog box opens.

3. Enter the user name of an account with the admin role.
4. Enter the password.

   The Zone Admin module appears (see Figure 31 on page 94).

Refreshing the fabric information

This function refreshes the display of *fabric* elements (switches, ports, devices, and AL_PAs) only. It does not affect any zoning element changes or update zone information in the Zone Admin module. To refresh the zone information displayed in the Zone Admin module, see "Refreshing the Zone Admin module information" on page 96.

This function allows you to refresh the fabric element information displayed at any time.

To refresh the fabric information:

In the Zone Admin module, select **View > Refresh Fabric**.

This refreshes the status for the fabric, including switches, ports, and devices.

Refreshing the Zone Admin module information

The information displayed in the Zone Admin module is initially a snapshot of the contents of the fabric zoning database at the time the module is launched. Any changes you make to this view are saved to a local buffer; they are not applied to the fabric zoning database until you invoke one of the transactional operations listed in the Actions menu.

Any local zoning changes are buffered by the Zone Admin module until explicitly saved to the fabric. If the fabric zoning database is independently changed by another user or from another interface (for example, the CLI) while Advanced Web Tools zoning changes are still pending, the refresh icon  starts to blink (after a 15 second polling delay). You can then choose to refresh the current Advanced Web Tools zoning view to reflect the new, externally changed contents of the fabric zoning database. Any pending local changes are then lost. You can also ignore the blinking refresh icon and save your local changes, overwriting the external changes that triggered the icon to blink.

Another reason to refresh zoning is to back out of current, unsaved work and start over.

You can refresh the zoning information at any time, either using the refresh icon (whether it is flashing or not) or from the View menu.

The following procedure updates the information in the Zone Admin module with the information saved in the zoning database on the switch.

CAUTION: When you refresh the buffered information in the Zone Admin module, any zoning configuration changes you have made and not yet saved are erased from the buffer and replaced with the currently enabled zone configuration information that is saved on the switch.

To refresh the local Zone Admin buffer from the fabric zoning database:

1. Launch the Zone Admin module as described on page 95.
2. Select **View > Refresh Zoning** or click the zone refresh icon  , located in the lower right corner of the Zone Admin module.

This refreshes the information in the Zone Admin module with the information in the switch's zoning database. This action also refreshes the fabric information as described in this section. Any unsaved zoning changes are deleted.

Saving local zoning changes

All information displayed and all changes made in the Zone Admin module are buffered until you save the changes. That means that any other user looking at the zone information for the switch does not see the changes you made until you save them. Saving the changes propagates any changes you have made in the Zone Admin module (buffered changes) to the zoning database on the switch. If another user has a zoning operation in progress at the time that you attempt to save changes, a warning is displayed indicating that another zoning transaction is in progress on the fabric. You can select to abort the other transaction and override it with yours.

This action updates the entire contents of the Zone Admin module, not just the selected zone, alias, or configuration. You can save your changes at any time during the zone administration session.

To save Zone Admin module changes to the switch zoning database:

1. Make your zoning changes in the Zone Admin module.
2. Select **Actions > Save Config Only**.

NOTE: If you made changes to a configuration, you must enable the configuration before the changes become effective. To enable the configuration, see "Enabling a zone configuration" on page 106.

Closing the Zone Admin module

It is very important to remember that any changes you make in the Zone Admin module are not saved automatically. HP recommends that you always close the Zone Admin module from the **File** menu as described in the following procedure.

CAUTION: If you click the **X** in the top right corner of the Zone Admin module, the Zone Admin session is closed immediately and any changes you made without saving are lost. To avoid potential loss of data, use the following procedure to close the Zone Admin module. In this procedure, the Zone Admin session displays a warning if you have unsaved changes when you are trying to close the Zone Admin module.

To safely close the Zone Admin module:

1. From the Zone Admin module, select **File > Close**.

   If any changes exist in the buffer that have not been saved, a warning dialog box opens, asking you to confirm that you want to close the Zone Admin session without saving the changes.

2. Click **Yes** to close without saving changes or click **No** to go back to the Zone Admin module to save the changes as described in "Saving local zoning changes" on page 96.

Zoning views

You can choose how zoning elements are displayed in the Zone Admin module. The zoning view you select determines how members are displayed in the Member Selection List panel (see Figure 31 on page 94). The views filter the fabric and device information displayed in the Member Selection List for the selected view, making it easier for you to create and modify zones, especially when creating hard zones.

Depending on the method you use to zone, some of the tabs may not be available in the Zone Admin module.

There are four views of defining members for zoning:

- Mixed zoning, which displays the port area number, device WWNs, or QuickLoop AL_PAs, and is useful when creating a soft zone.
- Port zoning, which displays port area numbers only, and is useful when creating a hard zone.
- WWN zoning, which displays device WWNs only, and is useful when creating a hard zone.
- AL_PA zoning, which displays QuickLoop AL_PAs only, and is useful when creating a soft zone.

To select a zoning view:

1. Launch the Zone Admin module as described on page 95.
2. From the **View** menu, select one of the following:
   - **Mixed Zoning**
   - **Port Zoning**
   - **WWN Zoning**
   - **AL_PA Zoning**

Managing zone aliases

An alias is a logical group of port area numbers, WWNs, or AL_PAs. Specifying groups of ports or devices as an alias makes zone configuration easier, by enabling you to configure zones using an alias rather than specifying a long string of individual members. You can specify members of an alias using the following methods:

- A switch domain and port area number pair: for example, `2, 20`
- Device node and device port WWNs
- QuickLoop AL_PAs

Creating and populating a zone alias

Use the following procedure to create a zone alias:

1. Launch the Zone Admin module as described on page 95.
2. Select a format to display zoning members in the Member Selection List as described in "Zoning views" on page 97.
3. Click the **Alias** tab.
4. Click **Create**.

   The Create New Alias dialog box opens.
5. Enter a name for the new alias, and click **OK** in the Create New Alias dialog box.

   The new alias appears in the Name list in the Alias tab.
6. Click **+** signs in the Member Selection List to view the nested elements.

   The choices available in the Member Selection List depend on the selection made in the View menu.
7. Click elements in the Member Selection List that you want to include in your alias.

   The **Add Member** button becomes active.
8. Click **Add Member** to add alias members.

   Selected members move to the Alias Members window.
9. Optional: Repeat step 7 and step 8 to add more elements to your alias.
10. Optional: Click **Add Other** to include a WWN, port, or QuickLoop (AL_PA) that is not currently a part of the fabric.

Adding and removing members of a zone alias

Use the following procedure to add or remove zone alias members:

1. Launch the Zone Admin module as described on page 95.
2. Click the **Alias** tab.
3. Select the alias you want to modify from the Name list.
4. Highlight an element in the Member Selection List that you want to add to your alias, or highlight an element in the Alias Members list that you want to delete.
5. Click **Add Member** to add the selected alias member. Click **Remove Member** to remove the selected alias member.

Renaming a zone alias

Use the following procedure to change the name of a zone alias:

1. Launch the Zone Admin module as described on page 95.
2. Click the **Alias** tab.
3. Select the alias you want to rename from the Name list.
4. Click **Rename**.

   The Rename an Alias dialog box opens.
5. Enter a new alias name and click **OK**.

The alias is renamed in the Zone Admin buffer.

Deleting a Zone Alias

You can remove a zone alias from the Zone Admin buffer. When a zone alias is deleted, it is no longer a member of the zones of which it was once a member.

To delete a zone alias:

1. Launch the Zone Admin module as described on page 95.
2. Click the **Alias** tab.
3. Select the alias you want to delete from the Name list.
4. Click **Delete**.

   The Confirm Deleting Alias dialog box opens.
5. Click **Yes**.

The selected alias is deleted from the Zone Admin buffer.

Managing zones

A zone is a region within the fabric in which specified switches and devices can communicate. A device can communicate only with other devices connected to the fabric within its specified zone. You can specify members of a zone using the following methods:

- Alias names
- Switch domain and port area number pair: for example, `2, 20`
- WWN (device)
- QuickLoop AL_PAs (device)

Creating and populating a zone

Use the following procedure to create and populate a zone:

1. Launch the Zone Admin module as described on page 95.
2. Select a format to display zoning members in the Member Selection List as described in "Zoning views" on page 97.
3. Click the **Zone** tab.
4. Click **Create**.

   The Create New Zone dialog box opens.

5. Enter a name for the new zone in the Create New Zone dialog box, and click **OK**.

   The new zone appears in the Name list.

6. Click + signs in the Member Selection List to view the nested elements.

   The choices available in the Member Selection List depend on the selection made in the View menu.

7. Select an element in the Member Selection List that you want to include in your zone.

   The Add Member button becomes active.

8. Click **Add Member** to add the zone member.

   The selected member is moved to the Zone Members window.

9. Optional: Repeat steps 7 and 8 to add more elements to your zone.
10. Optional: Click **Add Other** to include a WWN, port, or QuickLoop (AL_PA) that is not currently a part of the fabric.

Adding and removing the members of a zone

Use the following procedure to add or remove zone members:

1. Launch the Zone Admin module as described on page 95.
2. Click the **Zone** tab.
3. Select the zone you want to modify from the Name list.

   The zone members for the selected zone are listed in the Zone Members list.

4. Highlight an element in the Member Selection List that you want to include in your zone, or highlight an element in the Zone Members list that you want to delete.
5. Click **Add Member** to add a zone member.
   Click **Remove Member** to remove a zone member.

Renaming a zone

Use the following procedure to change the name of a zone:

1. Launch the Zone Admin module as described on page 95.
2. Click the **Zone** tab.
3. Select the zone you want to rename from the Name list.
4. Click **Rename**.

   The Rename a Zone dialog box opens.

5. Enter a new zone name and click **OK**.

The zone is renamed in the Zone Admin buffer.

Deleting a zone

Use the following procedure to delete a zone:

1. Launch the Zone Admin module as described on page 95.
2. Click the **Zone** tab.
3. Select the zone you want to delete from the Name list.
4. Click **Delete**.

   The Confirm Deleting Zone dialog box opens.

5. Click **Yes**.

The selected zone is deleted from the Zone Admin buffer.

Managing QuickLoops

QuickLoop is an HP software product that allows multiple ports on a switch to create a logical loop. Devices connected via QuickLoop appear to each other as if they are on the same arbitrated loop.

QuickLoop can be administered using Fabric OS v4.x versions; however, switches or directors running Fabric OS v4.x cannot be members of a QuickLoop. HP StorageWorks Core Switch 2/64, SAN Director 2/128, SAN Switch 2/8V, SAN Switch 2/8V, SAN Switch 2/32, and SAN Switch 4/32 cannot be members of a QuickLoop.



NOTE: You must have a QuickLoop license installed to create or modify a QuickLoop.

Creating a QuickLoop

Use the following procedure to create a QuickLoop:

1. Launch the Zone Admin module as described on page 95.
2. Select a format to display zoning members in the Member Selection List as described in "Zoning views" on page 97.
3. Click the **QuickLoop** tab.
4. Click **Create**.

   The Create New QuickLoop dialog box opens.
5. Enter a name for the new QuickLoop.
6. Click **OK**.
7. Click an element in the Member Selection List that you want to include in your QuickLoop.

   The Add Member button becomes active.



NOTE: There is a limit of two members per QuickLoop. Only switches capable of running QuickLoop are displayed in the Member Selection List.

8. Click **Add Member** to add QuickLoop members.

   Selected members are moved to the QuickLoop Members area.
9. Optional: Repeat step 7 and step 8 to add a second element to your QuickLoop.

Adding and removing members of a QuickLoop

Use the following procedure to add or remove members of a QuickLoop:

1. Launch the Zone Administration module as described on page 95.
2. Click the **QuickLoop** tab.
3. Select the QuickLoop you want to modify from the Name d list.
4. Highlight an element in the Member Selection List that you want to include in your QuickLoop, or highlight an element in the QuickLoop Members that you want to delete.

NOTE: There is a limit of two members per QuickLoop. Only switches capable of running QuickLoop are displayed in the Member Selection List.

5. Click **Add Member** to add a QuickLoop member or click **Remove Member** to remove a QuickLoop member.

Renaming a QuickLoop

Use the following procedure to change the name of a QuickLoop:

1. Launch the Zone Admin module as described on page 95.
2. Click the **QuickLoop** tab.
3. Select the QuickLoop you want to rename from the Name list.
4. Click **Rename**.

   The Rename a QuickLoop dialog box opens.
5. Enter a new QuickLoop name and click **OK**.

The QuickLoop is renamed in the Zone Admin buffer.

Deleting a QuickLoop

Use the following procedure to delete a QuickLoop:

1. Launch the Zone Admin module as described on page 95.
2. Click the **QuickLoop** tab.
3. Select the QuickLoop you want to delete from the Name list.
4. Click **Delete**.

   The Confirm Deleting QuickLoop dialog box opens.
5. Click **Yes**.

The selected QuickLoop is deleted from the Zone Admin buffer.

Managing Fabric Assist zones

Fabric Assist (FA) is an extension to QuickLoop. An FA zone allows private hosts to communicate with public or private targets across the fabric.

FA zones can be administered using Fabric OS v4.x; however, switches or directors running Fabric OS v4.x cannot be members of a Fabric Assist zone. HP StorageWorks Core Switch 2/64, SAN Director 2/128, SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 cannot be members of an FA zone.

NOTE: You must have a QuickLoop license installed to create or modify an FA zone.

Creating a Fabric Assist zone

Use the following procedure to create an FA zone. For this example, the mixed zone level is used.

1. Launch the Zone Admin module as described on page 95.

2. Select **View > Mixed Zoning**. You can select any view except the AL_PA view.

   The Mixed View tab opens.

3. Click the **Fabric Assist** tab.
4. Click **Create**.

   The Create New FA dialog box opens.

5. Enter a name for the new FA zone and click **OK**.

   A fabric host is required.

6. Click the FA zone members from the Member Selection List.
7. Click **Add Member**.

The new members appear in the Fabric Assist Members area. The newly created FA zone also appears in the **Config** tab.

Adding and removing Fabric Assist zone members

Use the following procedure to add and remove Fabric Assist zone members:

1. Launch the Zone Admin module as described on page 95.
2. Click the **Fabric Assist** tab.
3. Select the FA zone you want to modify from the Name list.
4. Click an element in the Member Selection List that you want to include in your FA zone, or click an element in the Fabric Assist Zone Members list that you want to delete.
5. Click **Add Member** to add an FA zone member or click **Remove Member** to remove an FA zone member.

Renaming a Fabric Assist zone

Use the following procedure to change the name of an FA zone:

1. Launch the Zone Admin module as described on page 95.
2. Click the **Fabric Assist** tab.
3. Select the FA Zone you want to rename from the Name list.
4. Click **Rename**.

   The Rename a Fabric Assist Zone dialog box opens.

5. Enter a new FA zone name and click **OK**.

The FA zone is renamed in the Zone Admin buffer.

Deleting a Fabric Assist zone

Use the following procedure to delete an FA zone:

1. Launch the Zone Admin module as described on page 95.
2. Click the **Fabric Assist Zone** tab.
3. Select the FA zone you want to delete from the Name list.
4. Click **Delete**.

   The Confirm Deleting Fabric Assist Zone dialog box opens.

5. Click **Yes**.

The selected FA zone is deleted from the Zone Admin buffer.

Managing zoning configurations

A zone configuration is a group of zones. Zoning is enabled on a fabric by enabling a specific configuration. You can specify members of a configuration using the following methods:

- Zone names
- QuickLoop names
- FA zone names

Figure 33 shows a sample zoning database and the relationship among the zone aliases, zones, and zoning configuration. The database contains one zoning configuration, `myconfig`, which contains two zones: `Zone A` and `Zone B`. The database also contains four aliases, which are members of Zone A and Zone B. Zone A and Zone B also have additional members other than the aliases.

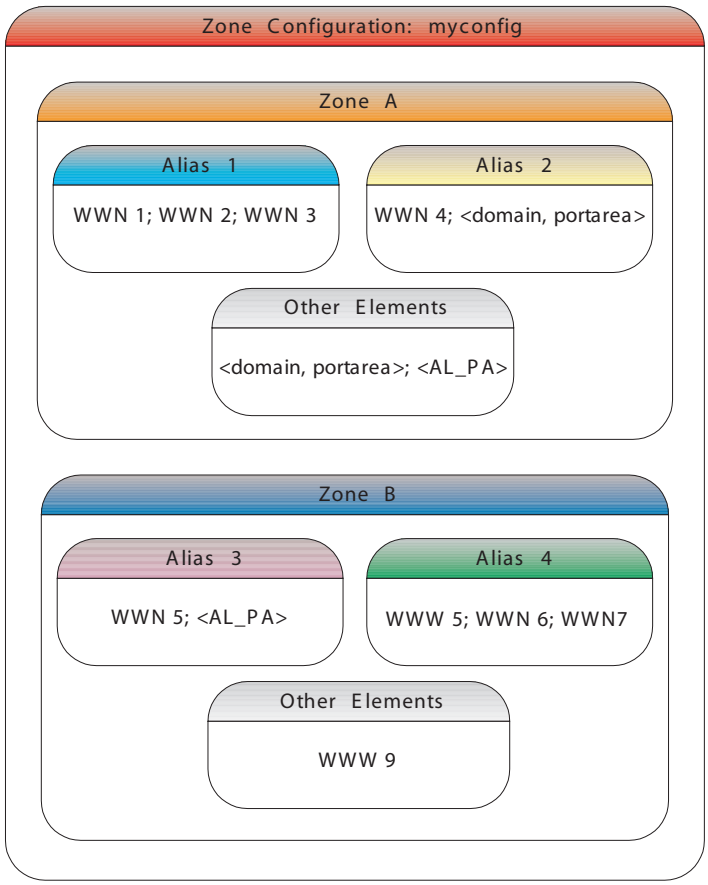


Figure 33 Sample zoning database

Creating a zoning configuration

Use the following procedure to create a zone configuration. After creating a zone configuration, you must explicitly enable it for it to take effect.

To create a zone configuration:

1. Launch the Zone Admin module as described on page 95.

2. Select a format to display zoning members in the Member Selection List as described in "Zoning views" on page 97.
3. Click the **Config** tab.
4. Click **Create**.

   The Create New Config dialog box opens.
5. Enter a name for the new configuration and click **OK**.

   The new configuration appears in the Name list.
6. Click + signs in the Member Selection List to view the nested elements.

   The choices available in the list depend on the selection made in the View menu.
7. Highlight an element in the Member Selection List that you want to include in your configuration.

   The Add Member button becomes active.
8. Click **Add Member** to add configuration members.

   Selected members are moved to the Config Members window.
9. Repeat step 7 and step 8 to add more elements to your configuration.
10. Select **Actions > Save Config Only** to save the configuration changes.

    To enable the configuration, see "Enabling a zone configuration" on page 106.



NOTE: Any changes made to the currently enabled configuration do not appear until the configuration is enabled.

Adding or removing zone configuration members

Use the following procedure to add or remove members of a zone configuration:



NOTE: You can make changes to a configuration that is currently enabled; however, changes do not appear until the configuration is enabled.

1. Launch the Zone Admin module as described on page 95.
2. Click the **Config** tab.
3. Select the configuration you want to modify from the Name list.
4. Click an element in the Member Selection List that you want to include in your configuration or click an element in the Config Members list that you want to delete.
5. Click **Add Member** to add a configuration member.
   Click **Remove Member** to remove a configuration member.
6. Select **Actions > Save Config Only** to save the configuration changes.

   To enable the configuration, see "Enabling a zone configuration" on page 106.

Renaming a zone configuration

Use the following procedure to change the name of a zone configuration:

NOTE: You cannot rename the currently enabled configuration.

1. Launch the Zone Admin module as described on page 95.
2. Click the **Config** tab.
3. Click the configuration you want to rename from the Name list.
4. Click **Rename**.

   The Rename a Config dialog box opens.
5. Enter a new configuration name and click **OK**.

   The configuration is renamed in the configuration database.
6. Select **Actions > Save Config Only** to save the configuration changes.

To enable the configuration, see "Enabling a zone configuration" on page 106.

Deleting a zone configuration

Use the following procedure to delete a zone configuration:

NOTE: You cannot delete a currently enabled configuration.

1. Launch the Zone Admin module as described on page 95.
2. Click the **Config** tab.
3. Select the configuration you want to delete from the Name list.
4. Click **Delete**.

   The Confirm Deleting Config dialog box opens.
5. Click **Yes**.

The selected configuration is deleted from the configuration database.

Enabling a zone configuration

Several zone configurations can reside on a switch at once, and you can quickly alternate among them. For example, you might want to have one configuration enabled during the business hours and another enabled overnight. Only one zone configuration, however, can be enabled at a time.

When you enable a zone configuration from Advanced Web Tools, keep in mind that the entire zoning database is automatically saved, and then the selected zone configuration is enabled.

To enable a zone configuration:

1. Launch the Zone Admin module as described on page 95.
2. Select **Actions > Enable Config**.

   The Enable Config dialog box opens.
3. Select the configuration to be enabled from the menu.

   A warning is displayed.
4. Click **OK** to save and enable the selected configuration.

Disabling a zone configuration

When you disable the active configuration, the Advanced Zoning feature is disabled on the fabric and all devices within the fabric can communicate with all other devices. This does not mean that the zoning database is deleted, however, only that there is no configuration active on the fabric.

When you disable a zone configuration from Advanced Web Tools, keep in mind that the entire zoning database is automatically saved, and then the selected zone configuration is disabled.

To disable a zone configuration:

1. Launch the Zone Admin module as described on page 95.
2. Select **Actions > Disable Zoning**.

   The Disable Config warning is displayed.
3. Click **Yes** to save and disable the current configuration.

Displaying the enabled zone configuration

The enabled zone configuration screen displays the actual content of the single zone configuration that is currently enabled on the fabric, whether or not it matches the configuration that was enabled when the current Zone Admin session was launched or last refreshed (see Figure 34). The zones, QuickLoops, and FA zones are displayed, and their contents (ports, WWNs, AL_PAs) are displayed next to them. Aliases are not displayed in the enabled zone configuration. If there is no active zone configuration enabled on the switch, a message is displayed to that effect.

The enabled configuration is listed in the top right corner of the Zone Admin module.

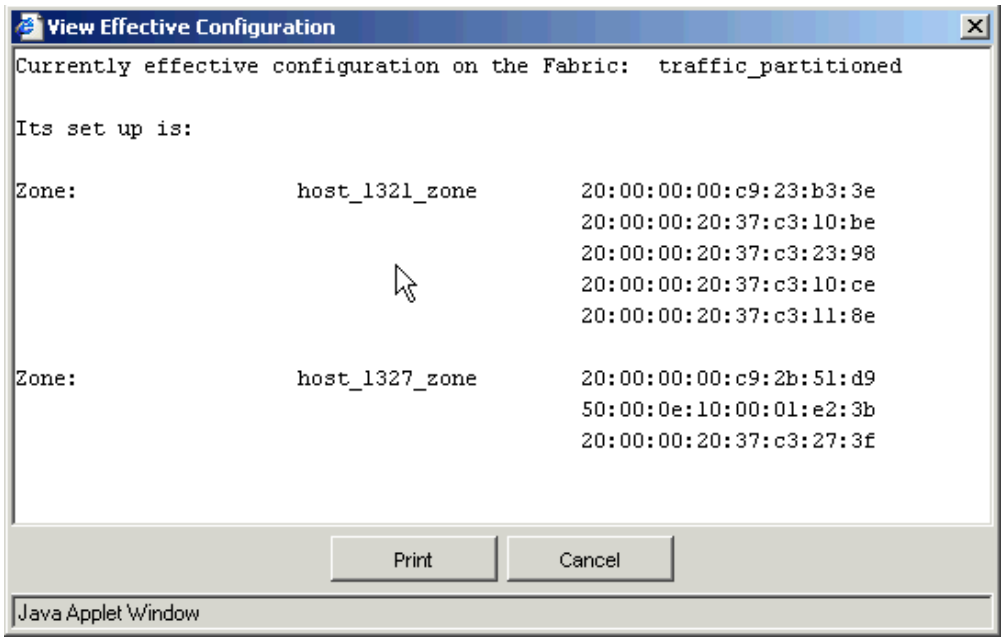


Figure 34 Effective Configuration window

To view the enabled zone configuration name without launching the Zone Admin module:

Select a switch from the Fabric Tree.

The selected switch appears in the Switch View. The current zone configuration name (if one is enabled) is displayed in the lower portion of the Switch Information View. If no zone configuration is enabled, the field displays `none`.

To view detailed information about the enabled zone configuration:

1. Launch the Zone Admin module, as described on page 95.

   The zone configuration in effect *at the time you launched the Zone Admin module* is identified in the top right corner. This information is automatically updated every 15 seconds. It is also updated if you manually refresh the Zone Admin module contents by clicking the refresh icon at the bottom right corner of the Zone Admin module, or when you enable a configuration through the Zone Admin module.

CAUTION: Clicking the refresh icon overwrites all local unsaved zoning changes. If anyone has made changes to the zones outside of your Zone Admin session, those changes are applied.

2. Use one of the following methods to identify the most recently effective zone configuration *without* saving or applying any changes you have made in the Zone Admin module:
   - Select **File > View Effective Configuration** in the Zone Admin module.
   - Click the enabled configuration button  in the Zone Admin module.

   Both of these actions display the Effective Configuration window. If no zone is enabled, a message is displayed, indicating that there is no active zoning configuration on the switch.

3. Optional: Click **Print** to print the enabled zone configuration details.

   This opens the Print dialog box.

Displaying the zone configuration summary

The zone configuration summary hierarchically lists all defined zoning elements known to the current Zone Admin session, whether or not any of the listed configurations have been enabled, and whether or not any of the lower-level elements have been added as members of the higher-level (aliases, zones, QuickLoops, FA zones) structures.

The zone configuration summary displays the entire contents of the fabric zoning database as it was at the time the Zone Admin session was launched, or the most recently saved or refreshed information, and any unsaved changes you made since the time the Zone Admin session was launched. It provides the name of the zone configuration that was enabled at the time you launched the Zone Admin session. Keep in mind, however, that the enabled configuration may have changed since then and that this screen does not reflect those changes.

To view a zone configuration summary report:

1. Launch the Zone Admin module as described on page 95.
2. Select **File > Print Summary**.

   The Zone Configuration Summary window opens (see Figure 35).

   It is important to note that the summary displays the information based on the changes just made. If current Zone Admin session changes have not yet been saved to the fabric, the information displayed here is different from what is seen from the switch.

3. Optional: Click **Print** to print the zone configuration summary.

   This opens the Print dialog box.

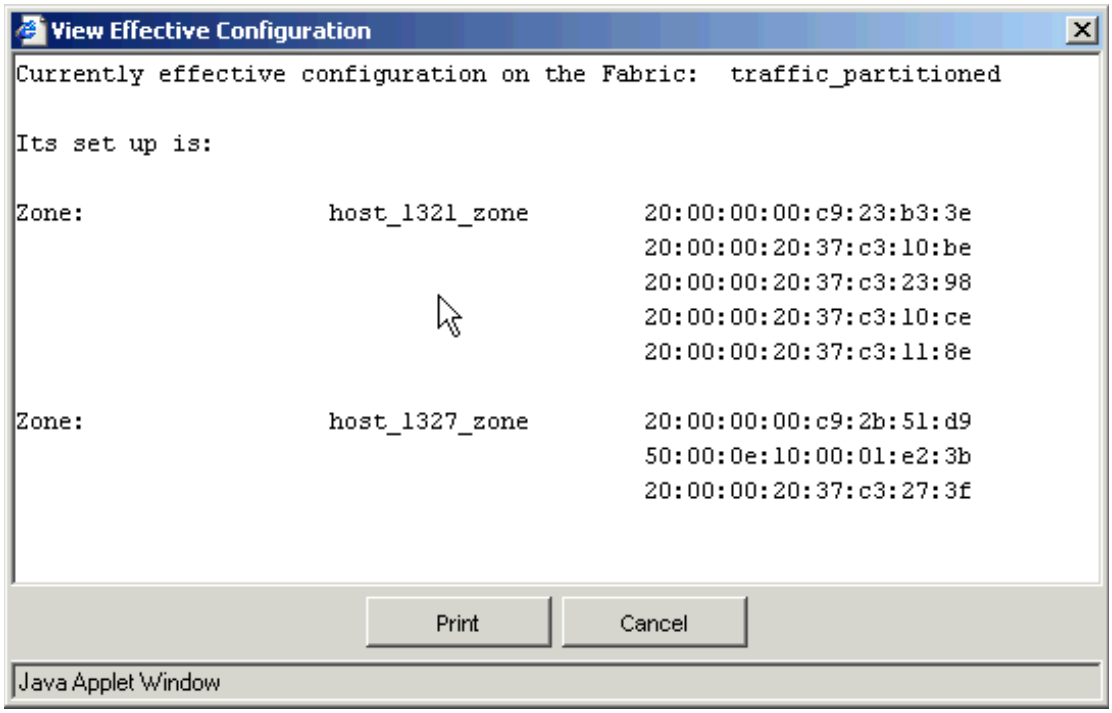


Figure 35 Zone Configuration summary

Creating a configuration analysis report

The configuration analysis report lists the following:

- SAN components (ports, WWNs, and AL_PAs) that are not included in the configuration
- SAN components (ports, WWNs, and AL_PAs) that are contained in the configuration, but not in the fabric

To create a configuration analysis report:

1. Launch the Zone Admin module as described on page 95.
2. Click the **Config** tab.
3. Select a configuration to be analyzed from the Name list.
4. Click **Analyze Config**.

   A dialog box opens, asking if you want to refresh the fabric before running the analysis.
5. Click **Yes** or **No**.

The configuration analysis window opens.

Displaying initiator/target accessibility

The Initiator/Target Accessibility Matrix shows a list of initiators and a list of targets and indicates which initiator can access which target.

To display an Initiator/Target Accessibility Matrix (Figure 36):

1. Launch the Zone Admin module as described on page 95.
2. Click the **Config** tab.
3. Select a configuration to be analyzed for device accessibility from the Name list.

4. Click **Device Accessibility**.

   The Initiator/Target Accessibility Matrix for Config- Device Selection dialog box opens.

5. Select devices you want displayed in the accessibility matrix; click the radio button to select all devices in the fabric or to select a subset of the devices.

   If you select a subset, you must click the devices from the Select Devices list and click **Add** to move them to the Evaluate for Accessibility list.

6. Click **OK**.

The Initiator/Target Accessibility Matrix appears. You can "mouse over" a target to display the symbolic name of the device. You can click a WWN to launch the device view for that device. In addition, you can right-click the device nodes and select View Device Detail to display detailed information about the selected device.

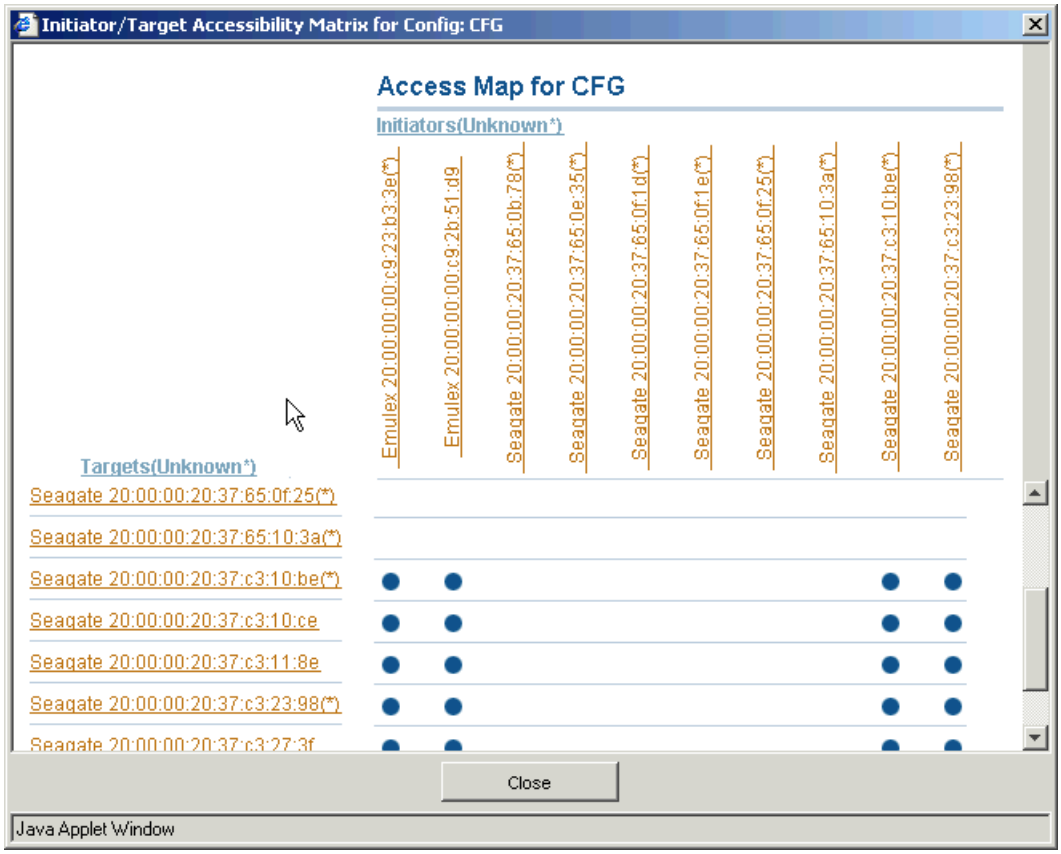


Figure 36 Initiator/Target Accessibility Matrix

Managing the zoning database

This section contains the following procedures for managing the zoning database:

- Adding a WWN to multiple aliases, zones, and FA zones, page 111
- Removing a WWN from multiple aliases, zones, and FA zones, page 111
- Replacing a WWN in multiple aliases, FA zones, and zones, page 111
- Searching for a zone member, page 112
- Clearing the zoning database, page 112

- Adding and removing members of a zone alias, page 98

Adding a WWN to multiple aliases, zones, and FA zones

This procedure enables you to configure a WWN as a member in a zone configuration prior to adding that device to the fabric. It is useful if you want to add a WWN to all or most zoning entities. The added WWN does not need to currently exist in the fabric.

To add a WWN to the Zone Admin buffer:

1. Launch the Zone Admin module as described on page 95.
2. Select **Edit > Add WWN**.

   The Add WWN dialog box opens.
3. Enter a WWN value in the WWN field.
4. Click **OK**.

   The Add WWN dialog box displays all the zoning elements that will include the new WWN, including aliases, zones, and FA zones. All of the elements are selected by default.
5. Click an item in the list to select or unselect, and then click **Add** to add the new WWN to all the selected zoning elements.

The WWN is added to the Zone Admin buffer and can be used as a member.

Removing a WWN from multiple aliases, zones, and FA zones

This procedure is useful if you want to remove a WWN from all or most zoning entities. To delete a WWN from the Zone Admin buffer:

1. Launch the Zone Admin module as described on page 95.
2. Select **Edit > Delete WWN**.

   The Delete WWN dialog box opens.
3. Enter a WWN value in the WWN field.
4. Click **OK**.

   The Delete WWN dialog box displays all the zoning elements that include the WWN.
5. Click items in the list to select or unselect, and then click **Delete** to delete the WWN from all the selected zoning elements.

The WWN is deleted from the selected items in the Zone Admin buffer.

Replacing a WWN in multiple aliases, FA zones, and zones

This procedure enables you to replace a WWN throughout the Zone Admin buffer. This is helpful when exchanging devices in your fabric and helps you to maintain your current configuration.

To replace a WWN in the Zone Admin buffer:

1. Launch the Zone Admin module as described on page 95.
2. Select **Edit > Replace WWN**.

   The Replace WWN dialog box opens.
3. Enter the WWN to be replaced in the Replace field.
4. Enter the new WWN in the By field.
5. Click **OK**.

The Replace WWN dialog box lists all the zoning elements that include the WWN.

6. Click an item in the list to select or unselect, and then click **Replace** to replace the WWN in all the selected zoning elements.

   The former WWN is replaced in the Zone Admin buffer by the new WWN, including within any alias or zone in which the old WWN was a member.

Searching for a zone member

You can search zone member selection lists for specified strings of text. If you know some identifying information about a possible member of a zoning entity, you can select the tab and view for that entity and then search through its member selection list using the Search for Zone Member option. If the target entity is an alias, zone, QuickLoop, or FA zone, the search domain includes elements like switch names and domain numbers, port names and "domain, port" addresses, device WWNs, and manufacturer names, and also any aliases that already have been defined. If the target entity is a configuration, zones, FA zones, and QuickLoops are also included, along with the elements they contain.

The search starts at the top of the list; when the target element is found, it is also selected in the Member Selection List so it can be added or its parent or children can be found. By default, the Member Selection List is searched from beginning to end one time. If you select the wraparound option, the search continues to loop from the beginning to the end of the Member Selection List.

To search for a zone member:

1. Launch the Zone Admin module as described on page 95.
2. Select **Edit > Search Member**.
3. Enter the zone member name in the Member Name field.

   Optional: Narrow the search by selecting one or more of the check boxes, such as **Match Case**.
4. Click **Next** to begin the zone member search.

Clearing the zoning database

Use the following procedure to disable the active zoning configuration, if one exists, and delete the entire zoning database:



CAUTION: This action not only disables zoning on the fabric but also deletes the entire zoning database. This results in all devices being able to communicate with all other devices.

1. Launch the Zone Admin module as described on page 95.
2. Select **Actions > Clear All**.

   The Disable Config warning opens.
3. Click **Yes** to do *all* of the following:
   - Disable the current configuration.
   - Clear the entire contents of the Zone Admin buffer.
   - Delete the entire persistent contents of the fabric zoning database.

This action is *not* recoverable.

Using zoning wizards

The Zone Admin module contains the following wizards to help you perform zoning tasks:

- Add Un-zoned Devices
- Remove Offline Devices
- Replace Offline Devices
- Define Device Alias

The wizards are accessed through the Tools menu in the Zone Admin module. The following sections describe the zoning tasks and the procedures for accessing the wizards for each task. The wizards are self-explanatory, so the specific steps are not documented here.

NOTE: The left side of each wizard window lists the steps you need to take to complete the task. The current step is in blue, as shown in Figure 37. Some of the wizards allow you to loop and repeat the task multiple times; as a result, each step is listed in this panel, so that you not only see the steps that you still need to perform, but also the steps that you have already performed. The step numbers do not necessarily match the overall numbering in this panel.

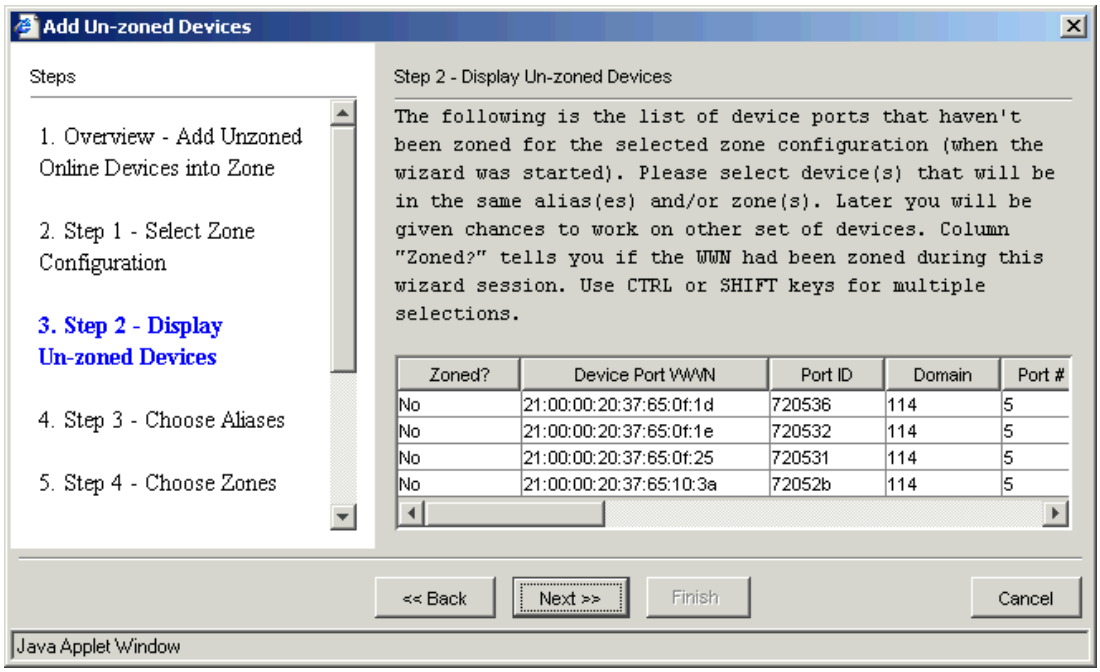


Figure 37 Add Un-zoned Devices wizard

Adding unzoned online devices to a zone or alias

When zoning is enabled, devices that are not included in a zone configuration are inaccessible to other devices in the fabric. Use the following procedure to identify online devices that are not zoned in any zone configuration and add them to a zone or alias.

To add unzoned online devices to a zone or alias:

1. Launch the Zone Admin module as described on page 95.
2. Select **Tools > Add Un-zoned Devices**.

   The Add Un-zoned Devices wizard opens.

3. Follow the steps outlined in the wizard.

The wizard displays unzoned devices and prompts you to select them and add them to an alias or a zone.

When you have finished the steps for adding a device to a zone or alias, if there are any more unzoned devices, you can either continue to add them or exit the wizard. If there are no more unzoned devices, you must exit the wizard.

Removing offline devices from the zoning database

Removing offline devices (WWNs) helps clean the zoning database to save space for new entries. Use the following procedure to view all devices that are no longer online and remove all or selected offline devices from the zoning database:

1. Launch the Zone Admin module as described on page 95.
2. Select **Tools > Remove Offline Devices**.

   The Remove Offline Devices wizard opens.
3. Follow the steps outlined in the wizard.

The wizard allows you to view all devices that are no longer online, and to remove all or selected offline devices from the zoning database.

Replacing offline devices

Replacing an offline device replaces its WWN with a new given WWN in all of its containing aliases and zones. Use the following procedure to view offline devices and replace them with new ones in the zoning database:

1. Launch the Zone Admin module as described on page 95.
2. Select **Tools > Replace Offline Devices**.

   The Replace Offline Devices wizard opens.
3. Follow the steps outlined in the wizard.

The wizard allows you to view all devices that are no longer online, and to replace all or selected offline devices with new ones (WWNs) in the zoning database.

Defining device aliases

Use the following procedure to define zone alias names for devices in a single process. This procedure is especially useful if you use one unique zoning alias to name each device port.

The alias definitions of the devices are saved in the zoning database on the switch, which has a size limit. If database size becomes a concern, reconsider your use of alias definitions.

To assign aliases to devices:

1. Launch the Zone Admin module as described on page 95.
2. Select **Tools > Remove Offline Devices**.

   The Define Device Alias wizard opens.
3. Follow the steps outlined in the wizard.

The wizard allows you to define one and only one name for each device port (WWN). Devices with one or more aliases are considered already named and are not displayed.

NOTE: To enter a zone alias name, double-click the Zone Alias field for each device, as shown in Figure 38, and enter the name. After entering each alias name, press **Enter** or click another zone alias field, or the wizard does not accept the name.

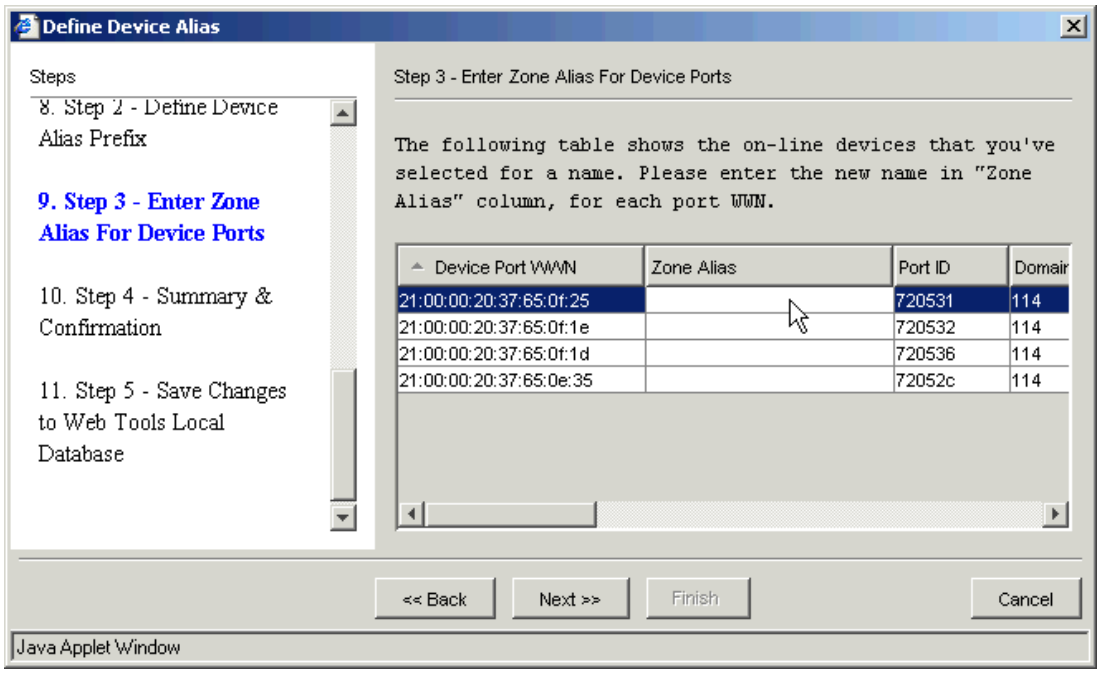


Figure 38 Entering a zone alias in the Define Device Alias wizard

6 Performance monitoring administration

This chapter contains the following sections:

- Monitoring performance using Advanced Web Tools, page 117
- Launching the Performance Monitor module, page 120
- Creating a basic Performance Monitor graph, page 120
- Customizing basic monitoring graphs, page 121
- Creating advanced performance monitoring graphs, page 123
- Managing performance graphs, page 126

Monitoring performance using Advanced Web Tools

The Advanced Web Tools Performance Monitor module graphically displays throughput in megabytes per second for each port and for the entire switch.

The basic-mode Performance Monitor is standard in the Advanced Web Tools software. The Advanced Monitoring menu in Performance Monitor is optionally licensed software.

Use the basic-mode Performance Monitor module to:

- Create user-definable reports.
- Display a performance canvas for application-level or fabric-level views.
- Save persistent graphs across reboots (which saves parameter data across reboots).

Using HP Advanced Performance Monitoring, you can display predefined reports for AL_PA, end-to-end, and filter-based performance monitoring. You can track:

- The number of CRC errors for AL_PA devices
- The number of words received and transmitted in Fibre Channel frames with a defined S_ID/D_ID pair
- The number of times a particular filter pattern in a frame is transmitted by a port

For detailed information on these types of performance monitoring, refer to the *HP StorageWorks Fabric OS 4.x features overview guide*.

Each graph is displayed individually in a window, so it can be minimized, maximized, resized, and closed. Graphs within the Performance Monitor module are updated every 30 seconds.

When you have multiple graphs open in the Performance Monitor module, you can:

- Select **Tile** from the Window menu to view all graphs at once, tiled in the Performance Monitor module.
- Select **Cascade** from the Window menu to view one graph at a time.
- Select **Close All** to close all open Performance Monitor graphs in the Performance Monitor module.

The Window menu also lists all open graphs. You can select a graph name from the Window menu to bring that graph to the front view when the graphs are cascaded, and to select the window for that graph when the graphs are tiled.

Predefined performance graphs

Advanced Web Tools predefines basic graph types to simplify performance monitoring. A wide range of end-to-end fabric, LUN, device, and port metrics graphs are included. Table 8 lists the basic monitoring graphs available. Table 9 on page 119 lists the advanced monitoring graphs. The advanced monitoring graphs give more detailed performance information to help you manage your fabric. You can access the basic monitoring graphs on all switches; advanced monitoring graphs are available only on switches that have an HP Advanced Performance Monitoring license activated.

Table 8 Basic performance graphs

Graph type	Description
Port Throughput	Displays the performance of a port in bytes per second for frames received and transmitted.
Switch Aggregate Throughput	Displays the aggregate performance of all ports on a switch.
Blade Aggregate Throughput	Displays the aggregate performance of all ports on a port card. This graph is available only for the Core Switch 2/64 and the SAN Director 2/128.
Switch Throughput Utilization	Displays the port throughput at the time the sample is taken. For the Core Switch 2/64 and the SAN Director 2/128, this graph displays the throughput for each slot. You can customize the graph to display information for particular ports.
Port Error	Displays a line of CRC errors for a given port.
Switch Percent Utilization	Displays the percentage utilization for each port in a switch. For the Core Switch 2/64 and the SAN Director 2/128, this graph displays the percent utilization for each slot. You can customize the graph to display information for particular ports.
Port Snapshot Error	Displays the CRC error count between sampling periods for all the ports on a switch. For the Core Switch 2/64 and the SAN Director 2/128, the graph displays the CRC error rate for each slot. You can customize the graph to display information for particular ports.

Table 9 Advanced performance monitoring graphs

Graph type	Description
SID/DID Performance	Displays the traffic between the SID-DID pair on the switch being managed. For more information, see "Creating an SID/DID performance graph" on page 123.
SCSI vs. IP Traffic	Displays percentage of SCSI versus IP frame traffic on each individual port. For more information, see "Creating a SCSI vs. IP traffic graph" on page 124.
AL_PA Errors	Displays CRC errors for a given port and a given AL_PA. For more information, see "Creating an AL_PA error graph" on page 125.
SCSI Commands by port and LUN (R, W, R/W)	Displays the total number of read/write commands on a given port to a specific LUN. For more information, see "Creating a SCSI command graph" on page 124.

The labeling of axes in the graphs depends on the switch type. For the Core Switch 2/64 and SAN Director 2/128, slot numbers are displayed with expandable arrows next to them. Click the arrows to expand and contract the list of ports per slot. For the SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32 slot numbers are not identified.

Figure 39 shows how to access the list of Advanced Performance Monitoring graphs using Advanced Web Tools. This example displays the graphs available in the Performance Monitor module for a SAN Director 2/128 with the Advanced Performance Monitoring license installed. Note that the slot number is identified.

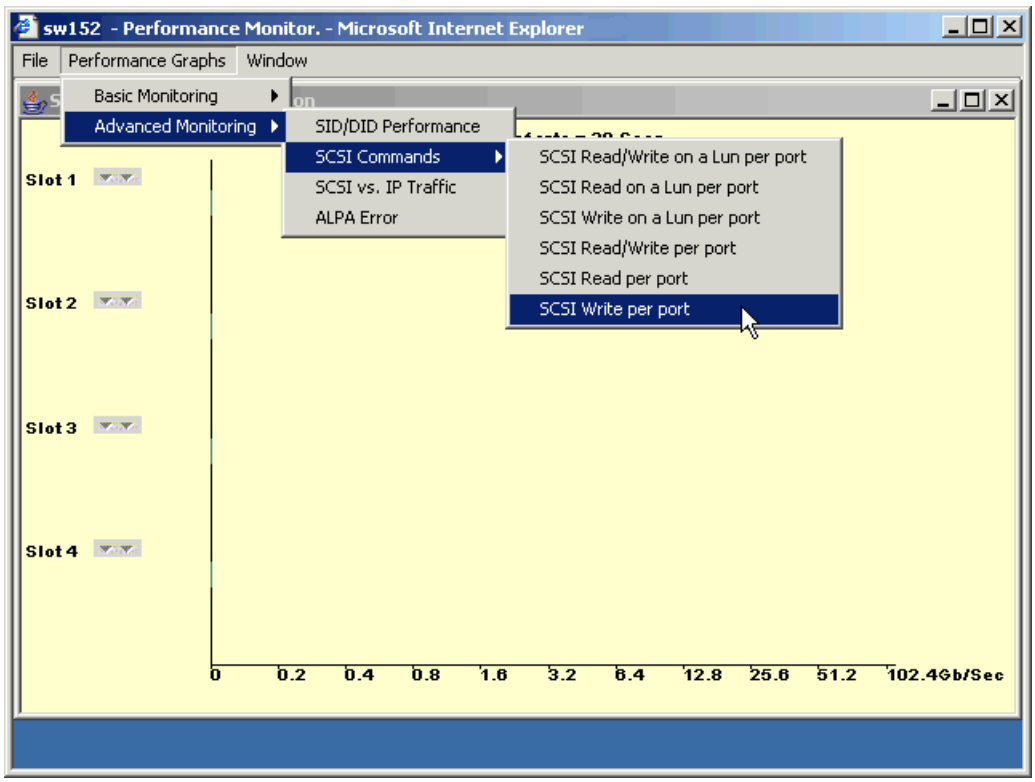


Figure 39 Accessing performance graphs

User-defined graphs

You can modify the predefined graphs to create your own customized graphs (see "Customizing basic monitoring graphs" on page 121 for more information). These user-defined graphs can be added and saved to canvas configurations, as described on page 126.

Canvas configurations

A *canvas* is a saved configuration of graphs. The graphs can be either the Advanced Web Tools predefined graphs or user-defined graphs. Each canvas can hold up to eight graphs per window, as shown in Figure 40. Up to 20 canvases can be set up for different users or different scenarios. Each canvas is saved with a name and an optional brief description.

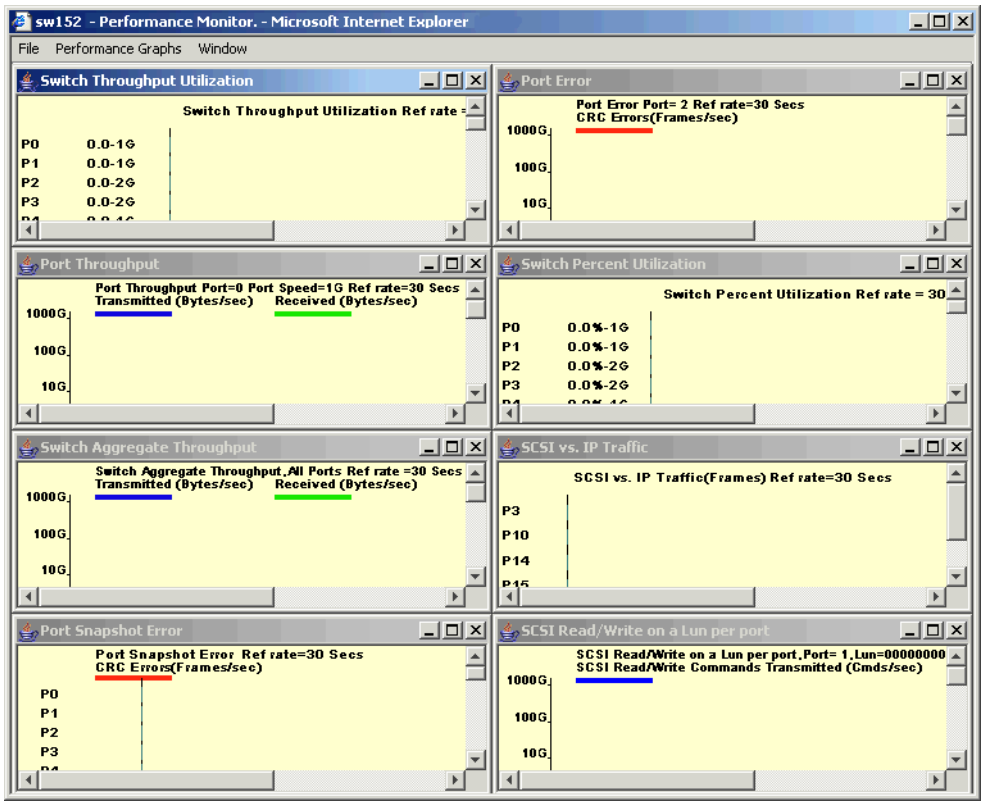


Figure 40 Canvas of eight performance monitoring graphs

Launching the Performance Monitor module

Use the following procedure to launch the Performance Monitor module:

1. Select a switch from the Fabric Tree.

   The selected switch appears in the Switch View.

2. Click the **Perf** button 

from the Switch View.

The Performance Monitor module opens.

Creating a basic Performance Monitor graph

To create the basic performance monitor graphs listed in Table 8 on page 118:

1. Launch the Performance Monitor.

2. Select **Performance Graphs > Basic Monitoring > *Graph Type*.**

   Depending on the type of graph you select, you may be prompted to select a slot or port for which to create a graph (see Figure 41).

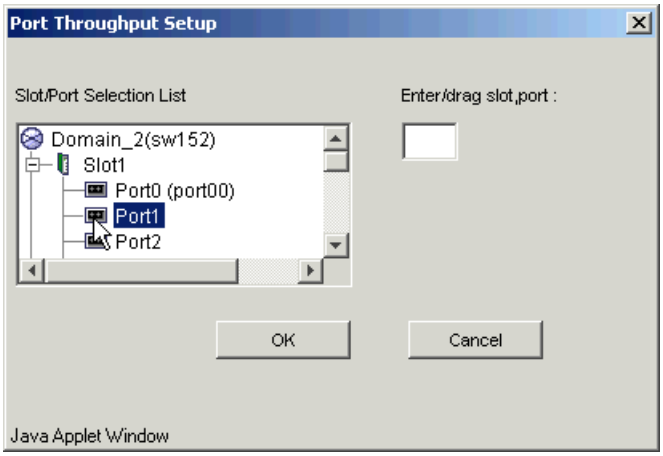


Figure 41 Creating a port throughput graph

3. If prompted, drag the port into the **Enter/drag slot,port** field, or manually enter the slot and port information in the field, in the format *slot,port*.

   For the Core Switch 2/64 and the SAN Director 2/128, you must select first a slot number and then a port number. For HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, you need only enter a port number.

4. Click **OK**.

   The graph is displayed in a window in the Performance Monitor module. The following section explains how to customize some of these graphs.

Customizing basic monitoring graphs

You can customize some of the basic Performance Monitoring graphs to display information for particular ports. For the Core Switch 2/64 and the SAN Director 2/128, you can also customize these graphs to display information for a slot.

You can customize the following graphs:

- Switch Throughput Utilization Graph
- Switch Percent Utilization Graph
- Port Snapshot Error Graph

The following procedure assumes that you have already created one of these customizable graphs.

To customize basic Performance Monitoring graphs:

1. Create or access the graph you want to customize. See "Creating a basic Performance Monitor graph" on page 120 for instructions on creating a graph.
2. For the Core Switch 2/64 and the SAN Director 2/128, to display detailed port throughput utilization rates for each port in a slot, click the arrows next to a slot. Port information for that slot is displayed in the graph.

   For the HP StorageWorks SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, and SAN Switch 4/32, proceed to step 3.

3. To display detailed port throughput utilization rates for particular ports only:
   a. Right-click anywhere in the graph.
   b. Select **Select Ports**.

      The setup dialog box opens (Figure 42). The title of the dialog box varies, depending on the type of graph you are customizing, but the layout of the dialog box is the same. Figure 42 shows an example of the setup dialog box for the Switch Throughput Utilization graph.

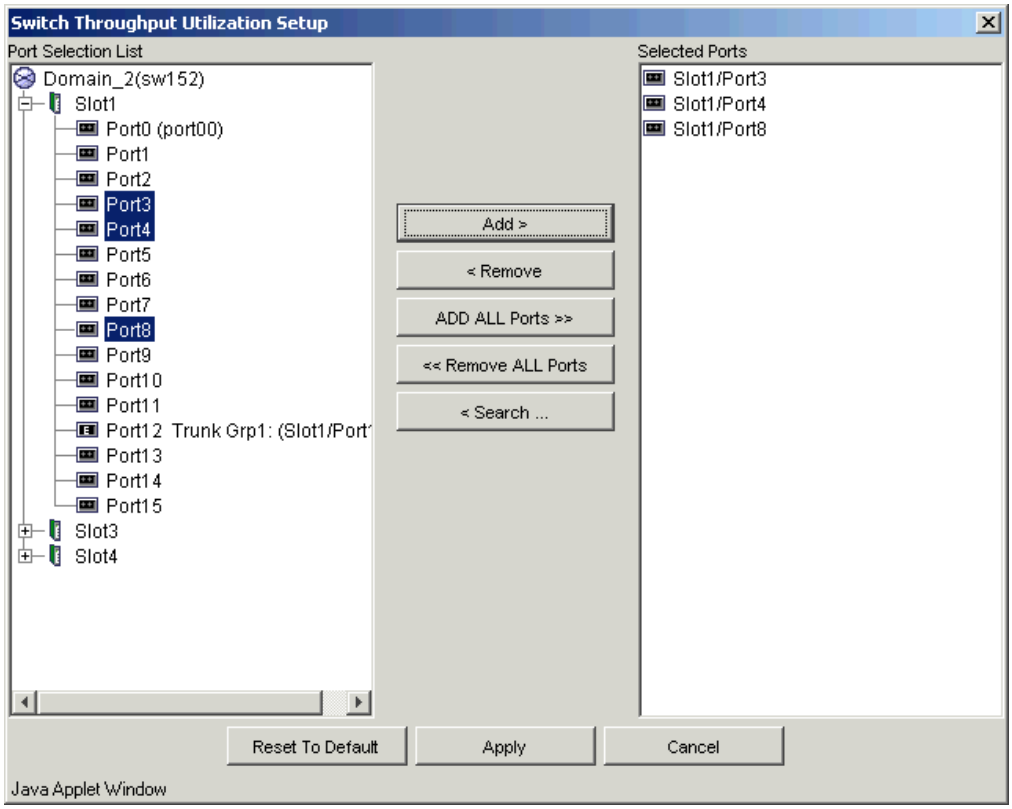


Figure 42 Switch Throughput Utilization setup dialog box

   c. Double-click the domain icon to expand the slot/port list.

      For the Core Switch 2/64 and the SAN Director 2/128, click the **+** signs to expand the ports under each slot, as shown in Figure 42.

   d. Click the port you want to monitor in the graph in the Port Selection List. Use **Shift+click** and **Ctrl+click** to select multiple ports.
   e. Click **Add** to move the selected ports to the Selected Ports list.
   f. Optional: Click **ADD ALL Ports** to add all of the ports in the Port Selection List to the Selected Ports list.
   g. Optional: Click **Search** to launch the Search Port Selection List dialog, from which you can search for all E_Ports, all F_Ports, or all port names with a defined string. Select the ports you want to add and click **Search** in the Search Port Selection List dialog box.
   h. Click **Apply** in the Switch Throughput Utilization Setup dialog box.

   Only the selected ports are displayed in the graph.

Creating advanced performance monitoring graphs

You can create the advanced performance monitor graphs listed in Table 9. Because the procedure for creating these graphs differs depending on the type of graph, each type is described separately in the sections that follow.

NOTE: You must have an Advanced Performance Monitoring license installed to use the Advance Performance Monitor features.

Creating an SID/DID performance graph

The SID/DID performance graph displays the traffic between a SID/DID pair on the switch being managed. To create a SID/DID performance graph:

1. Launch the Performance Monitor module as described on page 120.
2. Select **Performance Graphs > Advanced Monitoring > SID/DID Performance**.

   The SID/DID Performance Setup dialog box opens (Figure 43).

   If you want to see which end-to-end (EE) monitors are currently set up on a particular port, proceed to step 3.

   If you want to specify the port, source ID, and domain ID, skip to step 4.

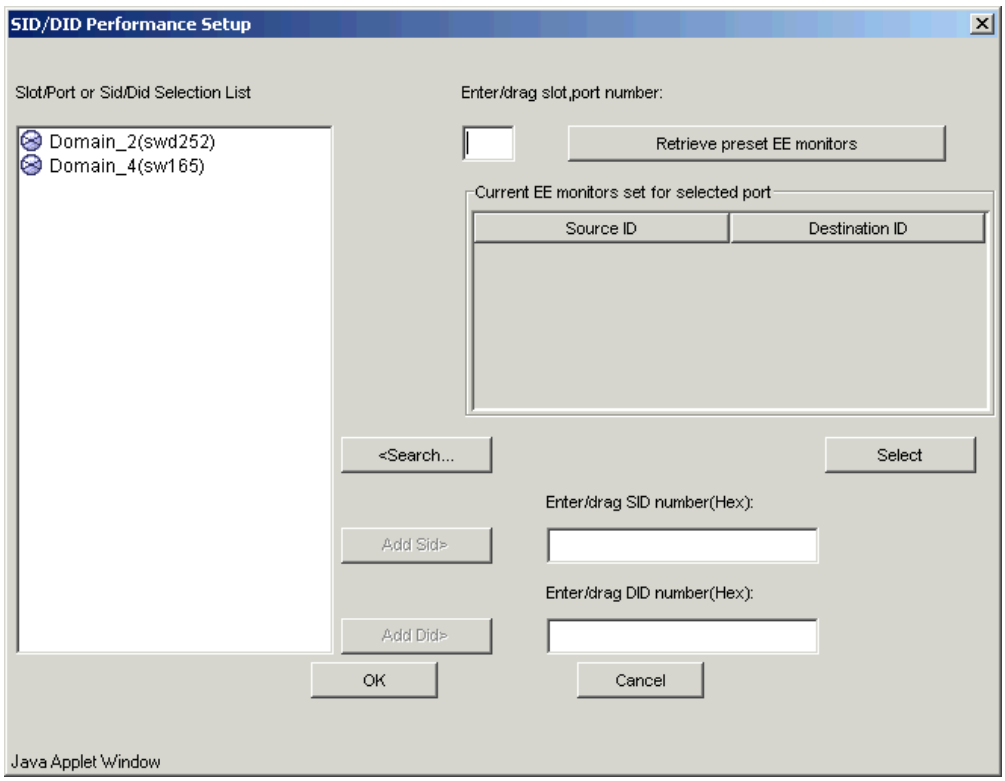


Figure 43 Creating an SID/DID performance graph

3. Click a port from the Slot/Port or Sid/Did Selection List.
   a. Drag the selected port into the Enter/drag port number field.
   b. Click **Retrieve preset EE monitors**.

The current end-to-end monitors for that port are displayed in the Current EE monitors set for selected port table.

c. Optional: To display a performance graph for the current EE monitors set for the selected port, click an SID-DID pair in the table. You can select multiple Source ID and Destination IDs. Click **Select**. If you selected multiple SID/DID monitors, click **OK** in the confirmation dialog box that opens. Skip to step 6.

   If you do not want to display a performance graph for the current EE monitors set for the selected port, continue with step 4.

4. Select a source ID from the Slot/Port or Sid/Did Selection List, and then click **Add Sid**. You can also type a source ID in the Enter/drag SID number field.
5. Click a destination ID from the Port or Sid/Did Selection List, and click **Add Did**. You can also type a destination ID in the Enter/drag DID number field.
6. Click **OK**.

   If you selected multiple EE monitors, SIDs, or PIDs, a confirmation dialog box opens, reminding you that one graph will be opened for each selection.

7. Click **Yes** to display the graphs.

Creating a SCSI vs. IP traffic graph

The SCSI vs. IP Traffic graph displays the SCSI vs. IP traffic for selected ports. For the Core Switch 2/64 and SAN Director 2/128, the slot and port name is identified in the graph.

To create a SCSI vs. IP Traffic graph:

1. Launch the Performance Monitor module as described on page 120.
2. Select **Performance Graphs > Advanced Monitoring > SCSI vs. IP Traffic**.

   The SCSI vs. IP Traffic Setup dialog box opens. This dialog box is similar to that shown in Figure 42 on page 122.

3. Double-click the domain icon  to expand the slot/port list.

   For the Core Switch 2/64 and SAN Director 2/128, click the + signs to expand the ports under each slot, as shown in Figure 42 on page 122.

4. Click the particular port you want to monitor in the graph in the Port Selection List. Use **Shift+click** and **Ctrl+click** to select multiple ports.
5. Click **Add** to move the selected ports to the Selected Ports list.
6. Optional: Click **ADD ALL Ports** to add all of the ports in the Port Selection List to the Selected Ports list.
7. Optional: Click **Search** to open the Search Port Selection List dialog box, from which you can search for all E_Ports, all F_Ports, or all port names with a defined string. Select the ports you want to add and click **Search** in the Search Port Selection List dialog box.
8. Click **Apply** in the SCSI vs. IP Traffic Setup dialog box.

   Only the selected ports are displayed in the SCSI vs. IP Traffic graph.

Creating a SCSI command graph

These graphs display the total number of read or write (or both) commands on a given port or to a specific LUN on a given port. To create a SCSI command graph:

1. Launch the Performance Monitor module as described on page 120.
2. Select **Performance Graphs > Advanced Monitoring > SCSI Commands > *Graph Type***.

The applicable setup dialog box opens. Figure 44 shows the SCSI Read/Write on a LUN per port Setup dialog box.

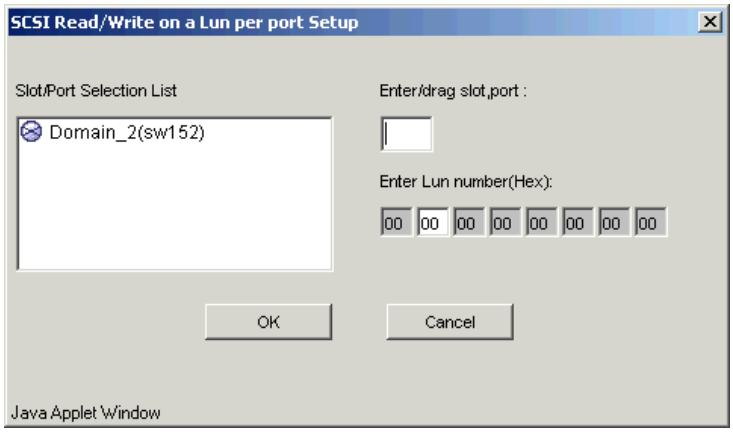


Figure 44 Creating a SCSI command graph

3. Navigate to a switch > slot > port in the Slot/Port Selection List.
4. Click the port from the Slot/Port Selection List and drag it into the Enter/drag slot,port field.
5. Optional: For the LUN per port graphs, type a LUN number in hexadecimal.

   For the SAN Switch 4/32, you can enter up to eight LUN masks.
   For all other switches running Fabric OS v4.x, you can enter up to two LUN masks.
   For switches running Fabric OS v3.x, you can enter up to three LUN masks.
6. Click **OK**.

The selected graph is displayed in the canvas.

Creating an AL_PA error graph

The AL_PA Error graph displays CRC errors for a given port and a given AL_PA. The AL_PA Error graph is not supported on the SAN Switch 4/32.

To create an AL_PA error graph:

1. Launch the Performance Monitor module as described on page 120.
2. Select **Performance Graphs > Advanced Monitoring > ALPA Error**.

   The AL_PA Error Setup dialog box opens (see Figure 45).

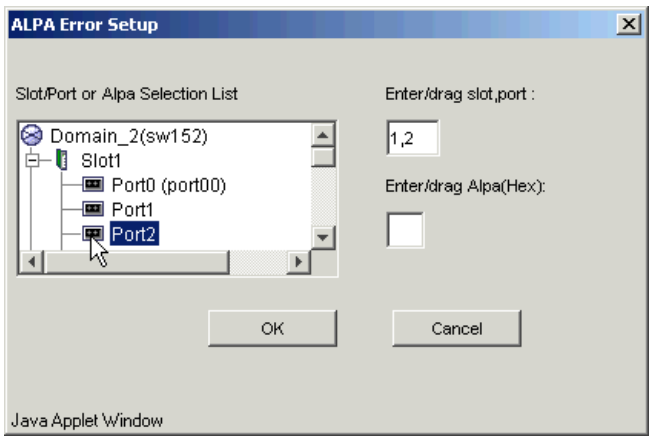


Figure 45 Creating an AL_PA error graph

3. Navigate to a *switch* > *slot* > *port* in the Slot/Port or Alpa Selection List.
4. Click the port from the Slot/Port Selection List or an AL_PA from the Slot/Port Selection List, and drag it into the Enter/drag slot,port field. You can also manually type the slot and port number, in the format *slot,port*.
5. Click **OK**.

The AL_PA error graph appears on the canvas.

Managing performance graphs

This section provides the following procedures for managing performance graphs:

- Adding a graph to an existing canvas, page 126
- Saving graphs to a canvas, page 126
- Printing graphs, page 127
- Modifying an existing graph, page 127

Adding a graph to an existing canvas

The following procedure assumes that a canvas is already created.

To create a new canvas, you must first create graphs, as described in "Creating a basic Performance Monitor graph" on page 120 and "Creating advanced performance monitoring graphs" on page 123, and then save those graphs to a canvas, as described in "Saving graphs to a canvas" on page 126.

To add a graph to an existing canvas:

1. Select **File > Display Canvas Configurations**.

   The Canvas Configuration List opens. The message `No Canvas configuration to display` is displayed if there are no saved canvas configurations.
2. Click a canvas in the list.
3. Click **Edit**.

   The Edit Canvas dialog box opens.
4. Click **Add**.

   A list of graphs is displayed.
5. Click a graph to add it to the canvas.
6. Click **Save**.

Saving graphs to a canvas

Saving graphs is especially useful when you create customized graphs and do not want to re-create them every time you access the Performance Monitor module.

When you save graphs, you must save them to a canvas. The following procedure describes how to save graphs to a new canvas.

To save graphs:

1. Launch the Performance Monitor module as described on page 120.
2. Create basic or advanced Performance Monitor graphs (see "Creating a basic Performance Monitor graph" on page 120 and "Creating advanced performance monitoring graphs" on page 123).

The graphs are displayed in the in the Performance Monitor window.

3. Select **File > Save Current Canvas Configuration**.

   The Save Canvas Configuration dialog box opens.

4. Type a name and description for the configuration and then click **Save Canvas**.

   A message appears, confirming that the configuration was successfully saved to the switch.

Printing graphs

You can print a single graph or all the graphs displayed on the selected canvas configuration. Only one canvas configuration can be opened at a time.

To print a single graph:

1. Launch the Performance Monitor module as described on page 120.
2. Create a basic or advanced Performance Monitor graph (see "Creating a basic Performance Monitor graph" on page 120 and "Creating advanced performance monitoring graphs" on page 123).
3. Right-click anywhere in the graph and click **Print**.

   The print dialog box opens.

4. Click **OK**.

To print all graphs in a canvas:

1. Launch the Performance Monitor module as described on page 120.
2. Select **File > Display Canvas Configurations**.

   The Canvas Configuration List appears. The message `No Canvas configuration to display` appears if there are no saved canvas configurations.

3. Select a canvas from the list and click **Load**.

   The graphs from that canvas are displayed in the Performance Monitor window.

4. Select **File > Print All Graphs**.

   The print dialog box opens.

5. Click **OK**.

Modifying an existing graph

Use the following procedure to modify an existing graph that is saved in a canvas:

1. Launch the Performance Monitor module as described on page 120.
2. Select **File > Display Canvas Configurations**.

   The Canvas Configuration List opens. The message `No Canvas configuration to display` appears if there are no saved canvas configurations.

3. Select a canvas from the list and click **Edit**.

   The Performance Monitor Canvas: *Canvas Name* dialog box opens.

4. Select a graph from the list and click **Edit**.



NOTE: The **Edit** button is enabled only for the graphs that are configurable or editable.

5. Make changes in the Edit dialog box, as necessary.

6. Click **OK** to close the Edit dialog box.
7. Click **Save** to save the changes and close the Performance Monitor Canvas dialog box.
8. Click **Close** to close the Canvas Configuration List.

7 Fabric Watch administration

This chapter contains the following sections:

- Introduction to Fabric Watch, page 129
- Using Fabric Watch with Advanced Web Tools, page 129
- Configuring Fabric Watch thresholds, page 131
- Configuring alarms for FRUs, page 134
- Displaying Fabric Watch alarm information, page 134
- Configuring e-mail notifications, page 135

Introduction to Fabric Watch

Fabric Watch is an HP optional software application that monitors the performance and status of switches and can automatically alert you when problems arise, before they become costly failures.

Fabric Watch tracks a variety of SAN fabric elements, events, and counters. For example, Fabric Watch monitors:

- Fabric resources, including fabric reconfigurations, zoning changes, and new logins
- Switch environmental functions, such as temperature, power supply, and fan status, along with security violations
- Port state transitions, errors, and traffic information for multiple port classes as well as operational values for supported models of Finisar smart GBICs and SFPs
- Performance information for AL_PA, end-to-end, and SCSI command metrics

Fabric Watch lets you define how often to measure each switch and fabric element and allows you to specify notification thresholds. Whenever fabric elements exceed these thresholds, Fabric Watch automatically provides notification using several methods, including e-mail messages, SNMP traps, and log entries.



NOTE: To use the Fabric Watch feature, you must have a Fabric Watch license installed on your switch.

For more detailed information regarding Fabric Watch, refer to the *HP StorageWorks Fabric OS 4.x Fabric Watch user guide*.

Using Fabric Watch with Advanced Web Tools

You can administer Fabric Watch operations through the W Fabric Watch module. Click the **Watch** button in the Switch View to access the Fabric Watch module shown in Figure 46.

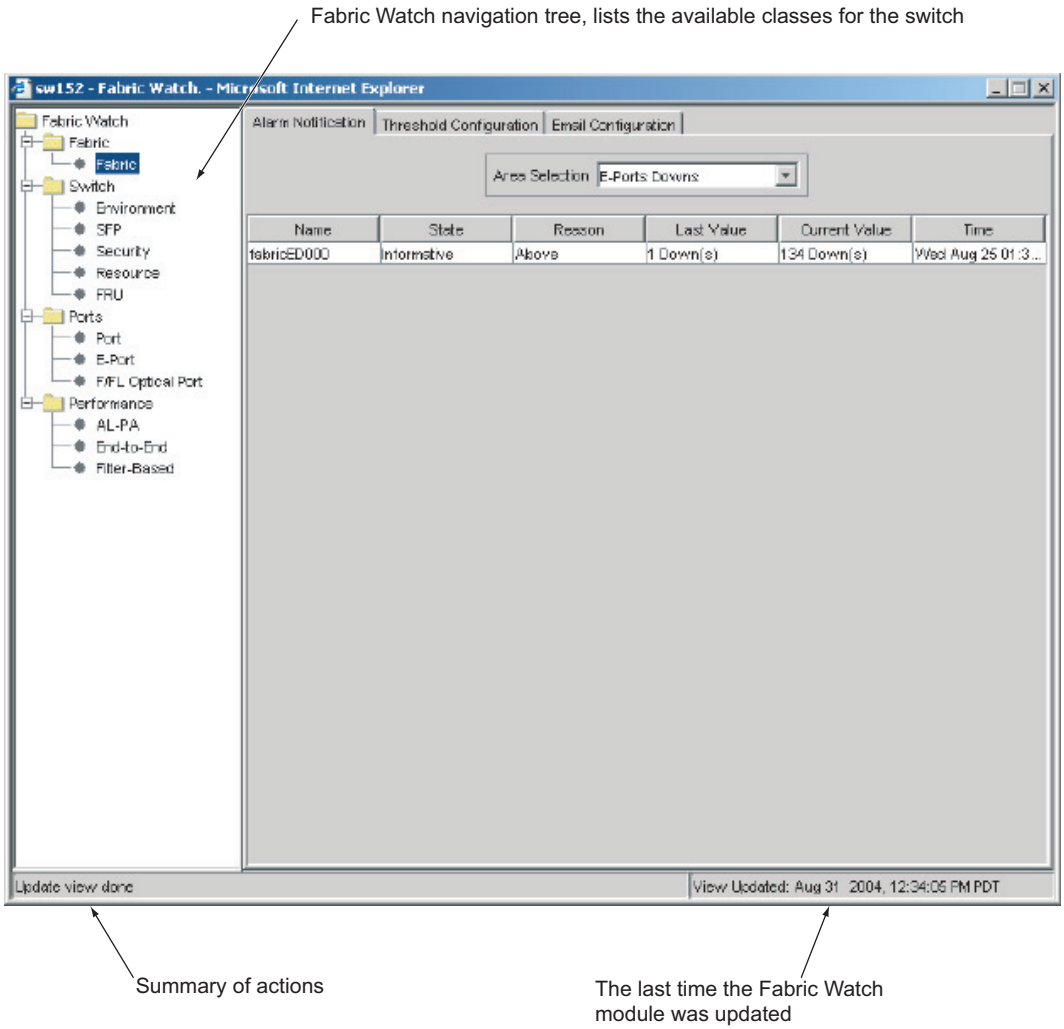


Figure 46 Fabric Watch module

The Fabric Watch navigation tree, on the left side of the module, displays the available classes. The classes are organized in a set of folders. Not all classes are available for all switches.

Use the Fabric Watch module if you want to:

- Configure custom threshold values on specific elements.
- Place limits on the acceptable values of those elements and enable the custom limits (configure threshold boundaries).
- Choose if and how Fabric Watch alerts you to errant values (configure alarms).
- Choose if and how frequently Fabric Watch identifies unacceptable values (configure threshold traits).

To launch the Fabric Watch module:

1. Select a switch from the Fabric Tree.

   The selected switch appears in the Switch View.

2. Click the **Watch** button  from the Switch View.

NOTE: The Watch button displays in the Switch View only if the Fabric Watch license has been activated.

The login dialog box opens.

3. Enter the user name of an account with the admin role.
4. Enter the password.

   The Fabric Watch module opens (see Figure 46).

Configuring Fabric Watch thresholds

The Threshold Configuration tab enables you to configure event conditions. From this tab, you configure threshold traits, alarms, and e-mail configuration.

Use the following procedures to configure threshold traits for all classes except for the FRU class. Use the procedure described in "Configuring alarms for FRUs" on page 134 for the FRU class.

Configuring threshold traits

Configure threshold traits to define a threshold for a specific class and area. Using the following procedure, you can configure the following traits for a threshold:

- **Unit:** the string used to define the units of measurement for the area
- **Time Base:** the time base for the area
- **Low Boundary:** the low threshold for the event-setting comparisons
- **High Boundary:** the high threshold for the event-setting comparisons
- **Buffer Size:** the size of the buffer zone used in event-setting comparisons

To configure threshold traits:

1. Launch the Fabric Watch module as described in "To launch the Fabric Watch module:" on page 130.
2. Click the **Threshold Configuration** tab (see Figure 47).

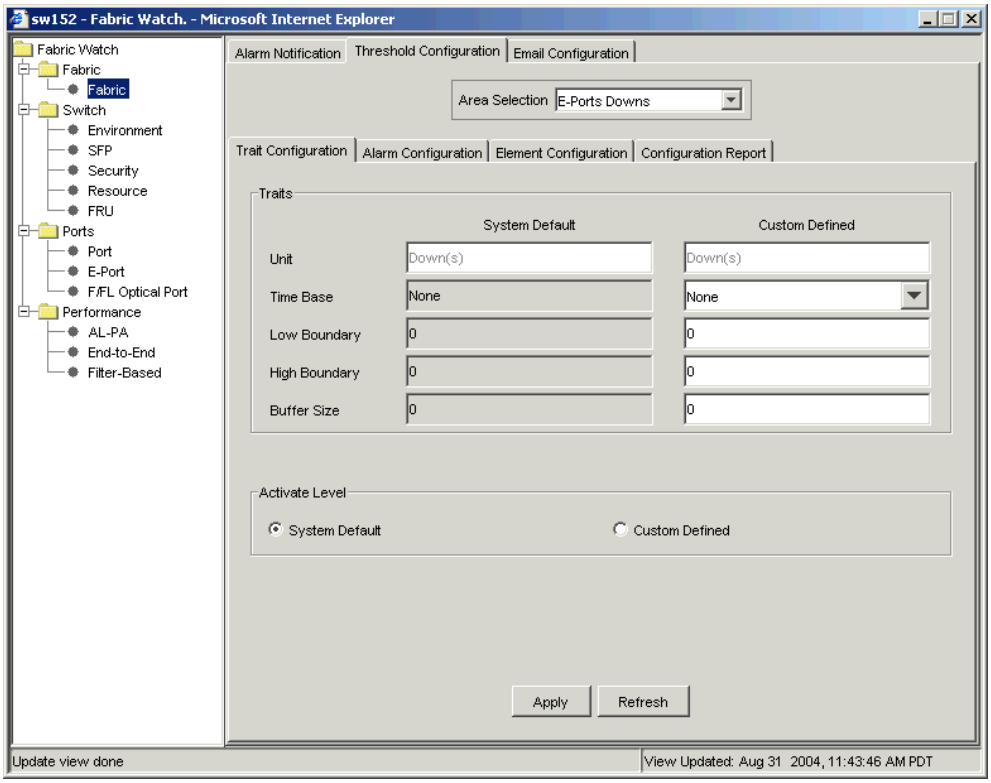


Figure 47 Threshold configuration for Fabric Watch

3. Click the **Trait Configuration** subtab.
4. Select a class from the Fabric Watch navigation tree.

NOTE: If you select the FRU class from the Fabric Watch navigation tree, there is a separate set of instructions. See "Configuring alarms for FRUs" on page 134.

5. Select an area from the Area Selection menu in the Threshold Configuration tab.

   The module displays two columns of trait information, labeled System Default and Custom Defined. You cannot modify the information in the System Default column.

6. Select the **System Default** radio button to use the system default settings, and proceed to step 12 or select the **Custom Defined** radio button to specify new settings and proceed to the next step.
7. Enter a unit of threshold measurement in the Unit field.
8. Select a time to record the event in the Time Base field.
9. Enter the lowest boundary of the normal zone in the Low Boundary field.
10. Enter the highest boundary of the normal zone in the High Boundary field.
11. Enter the size of the buffer zone in the Buffer Size field.
12. Click **Apply** to save your changes.

Configuring threshold alarms

After you update the threshold information, use the Alarm Configuration subtab (shown in Figure 46 on page 130) to customize the notification settings for each event setting.

To configure threshold alarms:

1. Launch the Fabric Watch module as described in "To launch the Fabric Watch module:" on page 130.
2. Click the **Threshold Configuration** tab.
3. Click the **Alarm Configuration** subtab.
4. Click a class from the Fabric Watch navigation tree.
5. Select an area from the Area Selection menu in the Threshold Configuration tab.

   The module displays two tables of alarm configuration information, labeled System Default and Custom Defined. You cannot modify the information in the System Default table.
6. Select the **System Default** radio button in the Activate Level section to use the system default settings, and proceed to step 8 or select the **Custom Defined** radio button in the Activate Level section to specify new settings and proceed to the next step.
7. Select a check box to set the type of notification method for each event type (Changed, Below, Above, Inbetween). The available alarm actions are ERROR_LOG, SNMP_TRAP, RAPI_TRAP, and EMAIL_ALERT.
8. Click **Apply**.

Enabling and disabling threshold alarms for individual elements

Use the Element Configuration subtab to configure element-specific alarm settings. To enable or disable threshold alarms for an element:

1. Launch the Fabric Watch module as described in "To launch the Fabric Watch module:" on page 130.
2. Click a class from the Fabric Watch navigation tree.

   You can set alarms for information on a switch only if that information is monitored by Fabric Watch for that switch; not all alarm options are available for all switches. For more information, refer to the *HP StorageWorks Fabric Watch 4.4.x user guide*.
3. Click the **Threshold Configuration** tab.
4. Select the area with the alarms that you want to enable or disable from the Area Selection menu.
5. Click the **Element Configuration** subtab.
6. Select an element from the Element Selection menu.
7. To disable threshold alarms, select **Disabled** in the Status area and then click **Apply**. The threshold alarms are disabled and you do not need to continue with this procedure.

   To enable threshold alarms, select **Enabled** in the Status area and continue with the next step.
8. Select a behavior type for the threshold alarms:
   - Select **Triggered** to receive threshold alarms only when they are triggered by events that you have defined.
   - Select **Continuous** to receive threshold alarms at a continuous interval. Select a time interval in which to receive the threshold alarms from the Time Interval menu.
9. Click **Apply**.
10. Optional: Apply the selections on this panel to multiple elements simultaneously.
    a. Click **Apply More**.

       The Multiple Selection dialog box opens
    b. Click the boxes next to the indices of all applicable elements.
    c. Click **OK**.

Configuring alarms for FRUs

Configuration for the FRU class is different from configuration for the other classes. Because FRUs are not monitored through a threshold-based system, they have a simpler interface for configuration. For FRUs, you configure the *states* for which an event occurs, as described in the following procedure.

To configure alarms for FRUs:

1. Launch the Fabric Watch module as described in "To launch the Fabric Watch module:" on page 130.
2. Click the **Threshold Configuration** tab.
3. Select the FRU class from the Fabric Watch navigation tree.
4. Select a FRU type from the Area Selection menu in the Threshold Configuration tab.
5. Select the alarm states for which you want an event to register.

   Whenever a FRU of the selected type is detected to be in one of the selected states, an event occurs.
6. Click the methods by which you want to be notified about the FRU alarms.

   For FRUs, the only options are error log and e-mail alert.
7. Click **Apply** to apply the changes to the switch.

   A confirmation dialog box opens, asking if you want to apply the changes to the switch.
8. Click **OK** in the confirmation dialog box to save the changes to the switch.

Displaying Fabric Watch alarm information

From the Fabric Watch module, you can view two types of reports:

- Alarm notifications, which display the alarms that have occurred for a selected class/area
- Alarm configurations, which display threshold and alarm configurations for a selected class/area

Displaying an alarm configuration report

Use the Threshold Configuration tab, Configuration Report subtab to display a report of the configuration for a selected class/area. The following information is displayed:

- Threshold settings (labeled Threshold Configuration)
- Notification settings (labeled Action Configuration)
- Element settings (not labeled)

You can scroll through this information but cannot make changes

To view an alarm configuration report:

1. Launch the Fabric Watch module as described in "To launch the Fabric Watch module:" on page 130.
2. Click the **Threshold Configuration** tab.
3. Select a previously configured element from the Fabric Watch navigation tree (see "Enabling and disabling threshold alarms for individual elements" on page 133).
4. Select the alarm area report to be viewed from the Area Selection menu.
5. Click the **Configuration Report** subtab.

This tab displays a report of the configuration for the selected area.

Displaying alarms

Using the Alarm Notification tab, you can view a list of all alarms that have occurred for a selected class/area (see Figure 46 on page 130). Table 10 describes the columns in this report. (Note that for the FRU class, only the Name, State, and Time columns are displayed. In addition, if the FRU area is Fan, the Name column refers to either a fan or a fan FRU, depending on the switch model. See "Displaying detailed fan hardware status" on page 87 for more information.)

Table 10 Alarm notification table fields

Field	Description
Name	The string assigned to the element that had an event
State	The current state of the element
Reason	The event type that was triggered
Last Value	The data value of the element when the event was triggered
Current Value	The current data value of the element
Time	Time when the event occurred

To view alarms:

1. Launch the Fabric Watch module as described in "To launch the Fabric Watch module:" on page 130.
2. Select the class that you want to check for alarms in the Fabric Watch navigation tree.
3. Click the **Alarm Notification** tab.
4. Select the area that you want to check for alarms from the Area Selection menu.

   All alarms for that area display.

For troubleshooting responses to alarms, refer to the *HP StorageWorks Fabric Watch 4.4.x user guide*.

Configuring e-mail notifications

One of the ways that you can be notified of an alarm condition is through an e-mail alert. If you have configured alarms to send an e-mail notification, you must also configure the e-mail server and the e-mail recipient, as described in the following sections.

Configuring the e-mail server on a switch

You must set up the e-mail notification recipient's DNS server and domain name on each switch for which e-mail notification is enabled.

When you set up the e-mail notification local network's DNS server and domain name for the Core Switch 2/64 and SAN Director 2/128, it is on a logical-switch basis. This means that for each logical switch, you must set up the e-mail notification recipient's DNS server and domain name individually.

To configure the e-mail server:

1. Launch the Switch Admin module as described in "Launching the Switch Admin module" on page 43.

2. Click the **Switch** tab.
3. Enter your primary domain Name Server IP address in the DNS Server 1 field in the Email Configuration area (see Figure 48).
4. Enter your secondary domain server IP address in the DNS Server 2 field.
5. Enter the domain name in the Domain Name field (between 4 and 32 characters).
6. Click **Apply** to save the changes.

Configuring the e-mail alert recipient

You can set a different e-mail alert configuration for each class. For example, you can set one e-mail notification for SFPs and another for E_Ports. Before configuring e-mail alert recipients, you must set up the e-mail notification recipient's DNS server and domain name. For more information, see "Configuring the e-mail server on a switch" on page 135.

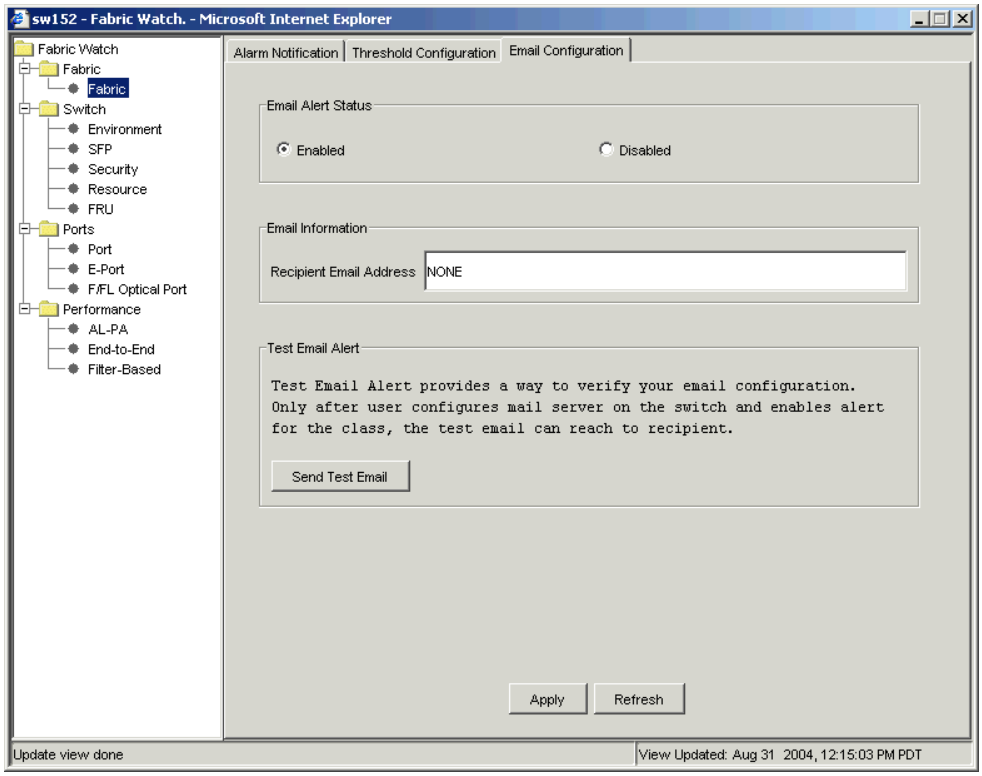


Figure 48 Fabric Watch e-mail configuration

To configure the Email Alert alarm:

1. Launch the Fabric Watch module as described in "To launch the Fabric Watch module:" on page 130.
2. Click the **Email Configuration** tab.
3. Select the **Enable** or **Disable** radio button to enable or disable the e-mail alert status.

   When you disable e-mail alerts, Fabric Watch does not send e-mail notification even if the e-mail notification method is assigned to monitored areas.
4. Type the e-mail address of the recipient in the Recipient Email Address text box.

   Messages are sent to this address when e-mail notification is enabled.



NOTE: E-mail addresses may not exceed 128 characters.

5. Click **Apply**.
6. Optional: Click **Send Test Email** to receive a test e-mail so you can verify the e-mail notification is working correctly.

   You can send a test e-mail only after you have applied your settings.

8 Issues and workarounds

This chapter provides the following information:

- General Advanced Web Tools issues and workarounds, page 140
- Platform-specific issues and workarounds, page 145
- Mozilla browser issues and workarounds, page 145

General Advanced Web Tools issues and workarounds

Table 11 lists issues and workarounds that apply to all browsers and switch platforms.

Table 11 Advanced Web Tools issues and workarounds

Issue	Details
Browser	The Fabric Watch, Switch Admin, HA, Name Server, and Zone Admin modules are separate applets embedded in HTML pages. The successful launch of the applet depends on whether the browser can successfully load the HTML page. Occasionally, you may see a blank browser window with the message `loading pages...` that is stuck. This is likely caused by a sudden loss of switch web server (either by normal HA failover, reboot, or other causes). **Workaround:** If the Fabric Watch, Switch Admin, HA, Name Server, or Zone Admin modules hang, close this window and relaunch the module.
Browser	An Advanced Web Tools browser window may stop responding following an HA failover immediately after a zoning configuration is enabled or disabled. It is likely that the web daemon was terminated by the HA failover before the HTTP request was sent back. **Workaround:** If one of the Advanced Web Tools modules is hanging, close the window and relaunch the module. If the module is locked, shut down and relaunch the Advanced Web Tools application.

Table 11 Advanced Web Tools issues and workarounds (continued)

Issue	Details
Firmware download	There are multiple phases to firmware download and activation. When Advanced Web Tools reports that firmware download has completed successfully, it indicates that a basic sanity check, package retrieval, package unloading, and verification was successful. Advanced Web Tools forces a full package install. To perform an incremental upgrade, use the Fabric OS CLI. **Workaround:** A reboot is required to activate the newly downloaded firmware. This reboot is performed automatically. Although Advanced Web Tools screens continue to be visible during the reboot, they are not available. Wait approximately 10 minutes to ensure that all of the application windows have been restored. If Advanced Web Tools fails to respond after 20 minutes, you may need to close all Advanced Web Tools applications windows and restart them, or contact your system administrator for network assistance. The Advanced Web Tools loss of network connectivity during a failover or reboot (initiated though the `firmwaredownload` command) varies for different configurations: • Core Switch 2/64 and SAN Director 2/128: loss of network connectivity is up to 5 minutes if the power-on self-test (POST) is disabled. If POST is enabled, the loss of network connectivity can exceed 5 minutes. • SAN Switch 2/8V, SAN Switch 2/16V, SAN Switch 2/32, SAN Switch 4/32: loss of network connectivity is up to 1 minute if POST is disabled. If POST is enabled, the loss of network connectivity can exceed 1 minute.
HTTP timeout	You may occasionally see the following message when you try to get data from a switch or send a request to the switch: `Failed to get switch response. Please verify the status of your last operation and try again if necessary.` This indicates that an HTTP request did not get a response. The request was sent to the switch, but the connection was down, probably caused by a temporary loss of the web server on the switch. Due to the nature of an HTTP connection, Advanced Web Tools reports this error after a 90-second default time-out. **Workaround:** Verify the status of your last request, using telnet to check related status, or click the **Refresh** button from the Advanced Web Tools application you were working on to retrieve related data. If your request did not get through to the switch, resubmit it. Executing a refresh from Advanced Web Tools retrieves a copy of switch data at that moment; the data you entered can be lost if it was not already committed to the switch.

Table 11 Advanced Web Tools issues and workarounds (continued)

Issue	Details
Java Plug-in	When there is a dialog box opened for a module (for example, Switch Admin, Zone Admin, or Fabric Watch) and you try to open another module, the initial login dialog box receives an error and closes. This is a known defect in the Java 1.3.1_04 Plug-in and is documented in Bug Id 4763605 (available from www.java.sun.com). **Workaround:** Close and reopen the module.
Licenses	If you remove the Web license after Advanced Web Tools application windows are opened, Advanced Web Tools displays the Web license missing dialog box. From this point on, Advanced Web Tools behavior is undefined if you continue with other operations after removing the license. **Workaround:** Close and relaunch the browser.
Loss of Connection	You may occasionally see the following message when you try to retrieve data from the switch or send a request to the switch: `Switch Status Checking` `The switch is not currently accessible.` The message title may vary, because it indicates which module is having the problem. **Workaround:** This is caused by the loss of HTTP connection with the switch, due to a variety of possible problems. Advanced Web Tools tries to regain the connection. While Advanced Web Tools is trying to regain the connection, check whether your Ethernet connection is still functioning. If the problem is not with the Ethernet connection, wait for Advanced Web Tools to recover the connection and display the following message: `You will have to resubmit your request after closing this message.` If the temporary switch connection loss is caused by switch hot code load, or another similar operation, the Switch Explorer you are currently running can be downloaded from a different firmware version than the new one. In this case the following message appears: `Switch connection is restored. The firmware version you are running is not in sync with the version currently on switch. Close your browser and re-launch Webtools.` You need to close Switch Explorer and relaunch Advanced Web Tools to reopen the connection.

Table 11 Advanced Web Tools issues and workarounds (continued)

Issue	Details
Performance Monitor	If the Web browser crashes or the Performance Monitor license is lost while the Performance Monitor module is running, some of the Performance Monitor resources owned by Advanced Web Tools may not be cleaned up correctly. **Workaround:** You may need to use the CLI to manually delete these counters. For example, if you detect Advanced Web Tools owned resources (using `perfshoweemonitor`), but you have verified that no Web users are actually using them, use the `perfdeleemonitor` or `perfcleareemonitor` command to free the resources.
Performance Monitor	For SCSI Read, Write, or Read/Write on a LUN per Port graphs, Fabric OS v4.1.0 (and later 4.x versions) allows you to enable only two bytes or less for the LUN value mask setting. Fabric OS v3.1 (and later 3.x versions) allows up to three bytes. Advanced Web Tools displays an error message if you exceed this limit. **Workaround:** There is no workaround.
Refresh option in browsers	When a pop-up window requesting a user response is pushed into the background and a refresh is requested, a fatal Internet Explorer error may occur. **Workaround:** Restart the browser.
Refresh option in browsers	Advanced Web Tools must be restarted when the Ethernet IP address is changed using the NetworkConfig View command. Advanced Web Tools appears to hang if it is not restarted after this operation is executed. **Workaround:** Restart the browser.
Refresh option in browsers	If you change the switch name or domain ID using the CLI after the Advanced Web Tools Switch Admin module starts, the new switch name or domain ID is not updated on the header of the Switch Admin page. Clicking the **Refresh** button does not fix the problem. **Workaround:** Click the **Switch** tab and the Switch Admin header updates.
Refresh option in browsers	If you change the switch name using the Advanced Web Tools Switch Admin page or SNMP and then open a telnet window to verify the name change, the CLI prompt (for example, `switch:admin>`) displays the previous name. The telnet prompt cannot pick up the new switch name until the switch is fastbooted. **Workaround:** To display the correct switch name in the CLI prompt after a switch name update using Advanced Web Tools or SNMP, fastboot the switch.

Table 11 Advanced Web Tools issues and workarounds (continued)

Issue	Details
Refresh option in browsers	Following a switch enable or disable, you must wait at least 25–30 seconds for the fabric to reconfigure and for FSPF route calculations to complete before requesting routing information. If access too early, routing information is not shown. **Workaround:** Following a switch enable or disable, wait at least 25–30 seconds before further action.
Refresh option in browsers	The Advanced Web Tools Switch Explorer may continue to display a switch from the Switch View, even when the switch has been removed from the fabric. **Workaround:** Relaunch the Switch Explorer. If the switch was removed from the fabric, the Fabric View window lists the switch as unavailable.
Refresh option in browsers	In the Switch Admin module, Switch tab, if you click the Refresh button, you might not be able to click the data entry fields to enter text. This behavior occasionally occurs on a notebook or laptop computer; it rarely happens on a desktop computer. **Workaround:** Close the browser window and restart it.
Switch View	Occasionally, switches may display the port icons correctly, but be missing one or more control button icons. **Workaround:** Close the Switch View of the switch and reopen it.
Windows Operating Systems	Occasionally, you will not see the `Lost connection to the switch` message on the Switch View even though the Ethernet connection has been lost. You might still be able to invoke various features from Switch View such as Status, Info, Fan Temp, Power and Beacon. This problem might be seen in the Core Switch 2/64, for example, when you see the `Lost connection to the switch` error for a single switch in the chassis, when a lost connection affects both logical switches. **Workaround:** Verify Ethernet connection to the switch by pinging the logical switch IP address.

Platform-specific issues and workarounds

Table 12 lists Advanced Web Tools issues specific to the Core Switch 2/64 and the SAN Director 2/128 when they are configured to have two domains.

Table 12 Platform-specific issues and workarounds

Issue	Details
Switch View	Neither CP is updated in the Switch View (see Figure 1 on page 25) when switch 0 is being rebooted. The CP data displayed on this Switch View is dependent on switch 0, and that data is not available when switch 0 is rebooting. **Workaround:** Wait until the reboot is finished and Switch View polling occurs; the CPs are then updated properly.
Java Plug-in	The Java Plug-in may sometimes have problems focusing on a particular field in an open applet if you have the same window open for both logical switches. **Workaround:** When this problem occurs, close and relaunch the affected applet.

Mozilla browser issues and workarounds

Table 13 lists limitations in Advanced Web Tools that occur when you use the Mozilla browser on a Linux system. These limitations do not occur when using Internet Explorer on Windows.

Table 13 Advanced Web Tools issues when using the Mozilla browser

Issue	Details
Mozilla Browser on Red Hat Operating System	On the Red Hat platform, the default system font size is larger than on other platforms. This can cause tabbed panes to not line up. There is no impact on functionality.
Mozilla Browser on Solaris Operating System	On a Solaris/Mozilla browser, some pop-up windows (for example, the firmware download completion message and performance monitor dialog boxes) display in the background, behind other windows. This can give the appearance of a session hang. **Workaround:** If you are apparently locked out of other windows in the Solaris/Mozilla environment, look for a pop-up window that needs to be dismissed before proceeding further.
Performance Monitor module	When creating performance graphs, you may not be able to drag and drop port numbers or AL_PAs in the graph setup dialog box. **Workaround:** Type the port numbers and AL_PAs in the appropriate fields.
Switch Admin, Routing tab	When you launch Advanced Web Tools and open the Switch Admin module for the first time, if you click the Routing tab, the FSPF route tree nodes are not displayed correctly. **Workaround:** Click another tab in the Switch Admin module and then click the **Routing** tab again.
Telnet	Mozilla browsers do not support the telnet application. **Workaround:** Launch an external telnet process.
Zone Admin	If you make changes in the Zone Admin module and then close the module without saving your changes, your changes are lost. If you have unsaved changes and you close the module by selecting File > Close, you receive a message warning that your changes are not saved and requesting confirmation before the module is closed. If you have unsaved changes and you close the module by clicking the X in the upper right corner of the window, you receive a warning message only if you are using Internet Explorer. If you are using the Mozilla browser, you do *not* receive this message and any unsaved changes are lost. **Workaround:** Always close the Zone Admin module by selecting File > Close. If you have not saved your changes, for all browsers, a warning message is displayed, requesting confirmation before the module is closed.

Glossary

This glossary defines terms used in this guide or related to this product and is not a comprehensive glossary of computer terms.

address identifier A 24-bit or 8-bit value that identifies the source or destination of a frame. *See also* SID *and* DID.

AL_PA Arbitrated-loop physical address. A unique 8-bit value assigned during loop initialization to a port in an arbitrated loop. Also called *arbitrated-loop parameters*.

alias A logical grouping of elements in a fabric. An alias is a collection of port numbers and connected devices that simplify the entry of port numbers and WWNs when creating zones.

area number In Fabric OS v4.0 and later, ports on a switch are assigned a logical area number. Port area numbers can be viewed by issuing the `switchshow` command. They define the operative port for many Fabric OS commands: for example, area numbers can be used to define the ports within an alias or zone.

ASIC Application-specific integrated circuit.

authentication The process of verifying that an entity in a fabric (such as a switch) is what it claims to be.

backbone fabric An optional capability that enables scalable meta-SANs by allowing the networking of multiple MP Routers, which connect to the backbone fabric via EB_Port interfaces.

BB fabric A backbone fabric that connects MP Routers. The MP Routers communicate over the backbone fabric using FCRP (Fibre Channel Router Protocol).

BB_Credit Buffer-to-buffer credit. The number of frames that can be transmitted to a directly connected recipient or within an arbitrated loop. Determined by the number of receive buffers available.

beacon A tool in which all of the port LEDs on a switch are set to flash from one side of the switch to the other, to enable visual identification of an individual switch in a large fabric. A switch can be set to beacon by a CLI command or through HP StorageWorks Advanced Web Tools.

block As applied to Fibre Channel technology, upper-level application data that is transferred in a single sequence.

CHAP Challenge-Handshake Authentication Protocol. Allows remote servers and clients to securely exchange authentication credentials. Both the server and client are configured with the same shared secret.

chassis The metal frame in which the switch and switch components are mounted.

circuit An established communication path between two ports. Consists of two virtual circuits capable of transmitting in opposite directions.

CLI Command line interface. An interface that depends entirely on the use of commands, such as through telnet or SNMP, and does not involve a GUI.

client An entity that, using its common transport (CT), makes requests of a server.

community (SNMP) A relationship between a group of SNMP managers and an SNMP agent, in which authentication, access control, and proxy characteristics are defined. *See also* SNMP.

configuration

1. A set of parameters that can be modified to fine-tune the operation of a switch. Use the `configshow` command to view the current configuration of your switch.

2. In HP Zoning, a zoning element that contains a set of zones. The configuration is the highest-level zoning element and is used to enable or disable a set of zones on the fabric. *See also* zone configuration.

core PID

Core switch port identifier. The core PID must be set for v3.1 and earlier switches included in a fabric of v4.1 switches. This parameter is located in the configure command of firmware versions v3.1 and earlier. All v4.1 switches and later use the core PID format by default; this parameter is not present in the configure command for these switches.

credit

As applied to Fibre Channel technology, the number of receive buffers available to transmit frames between ports. *See also* BB_Credit.

DID

Destination identifier. A 3-byte field in the frame header that indicates the address identifier of the N_Port to which the frame is headed.

defined zone configuration

The set of all zone objects defined in the fabric. Can include multiple zone configurations. *See also* enabled zone configuration, zone configuration.

director

An HP StorageWorks Core Switch 2/64 or SAN Director 2/128.

DLS

Dynamic load-sharing. Dynamic distribution of traffic over available paths. Allows for the recomputing of routes when an Fx_Port or E_Port changes status.

domain ID

A unique identifier for all switches in a fabric; it is used in routing frames. Usually assigned by the principal switch, but can be assigned manually. The domain ID for an HP StorageWorks switch can be any integer between 1 and 239.

E_D_TOV

Error-detect time-out value. The minimum time a target waits for a sequence to complete before initiating recovery. Can also be defined as the maximum time allowed for a round-trip transmission before an error is declared. *See also* R_A_TOV.

E_Port

Expansion port. A standard Fibre Channel mechanism that enables switches to network with one another, creating an ISL. *See also* ISL.

edge fabric

A Fibre Channel fabric connected to an MP Router through an EX_Port (where hosts and storage are attached in a meta-SAN). *See also* MP Router, metro-SAN

enabled zone configuration

The currently enabled configuration of zones. Only one configuration can be enabled at a time. *See also* defined zone configuration, zone configuration.

error

As applied to the Fibre Channel industry, a missing or corrupted frame, time-out, loss of synchronization, or loss of signal (link errors).

EX_Port

A type of E_Port that connects a switch to an edge fabric. EX_Ports limit the scope of fabric services, but provide device connectivity using FC-NAT.

exchange

The highest-level Fibre Channel mechanism used for communication between N_Ports. Composed of one or more related sequences, it can work in either one direction or both directions.

exported device

A device that has been mapped between fabrics (a host or storage port in one edge fabric can be exported to any other fabric by using LSAN zoning).

F_Port

Fabric port. A port that is able to transmit under fabric protocol and interface over links. Can be used to connect an N_Port to a switch. *See also* FL_Port, Fx_Port.

fabric

A collection of Fibre Channel switches and devices, such as hosts and storage. Also called a *switched fabric*. *See also* SAN, topology.

fabric application platform

A device that enables fabric-based storage applications such as mirroring, data migration, snapshots, and virtual tape. The HP StorageWorks Fabric Application Platform can run in a central location, process data at wire-speed, and reside in existing data paths.

fabric services Codes that describe the communication to and from any well-known address.

fabric topology The arrangement of switches that form a fabric.

FC-4 Layer of Fibre Channel transport that handles standards and profiles for mapping upper-level protocols such as SCSI and IP onto the Fibre Channel Protocol.

FC-GS-3 Fibre Channel Generic Services, third generation.

FCIP Fibre Channel over IP.

FC-NAT Fibre Channel network address translation.

FCIP tunneling service The HP StorageWorks Multiprotocol SAN Routing Service that enables SANs to span longer distances than can be supported with native Fibre Channel links. FCIP is a TCP/IP-based tunneling protocol that allows the transparent interconnection of geographically distributed SAN islands through an IP-based network.

FCP Fibre Channel Protocol. Mapping of protocols onto the Fibre Channel standard protocols. For example, SCSI FCP maps SCSI-3 onto Fibre Channel.

FCRP Fibre Channel Router Protocol. A protocol that enables LSAN switches to perform routing between different edge fabrics, optionally across a backbone fabric.

FCRS Fibre Channel Routing Service. The HP StorageWorks Multiprotocol SAN Routing Service that extends hierarchical networking capabilities to Fibre Channel fabrics. Sometimes called *FC-to-FC routing*, FCRS enables devices located on separate fabrics to communicate without merging the fabrics. It also enables the creation of LSANs. *See also* MP Router.

FC-SW-2 The second-generation Fibre Channel Switch Fabric standard defined by ANSI. Specifies tools and algorithms for the interconnection and initialization of Fibre Channel switches to create a multiswitch Fibre Channel fabric.

Fibre Channel The primary protocol used for building SANs to transmit data between servers, switches, and storage devices. Unlike IP and Ethernet, Fibre Channel is designed to support the needs of storage devices of all types. It is a high-speed, serial, bidirectional, topology-independent, multiprotocol, and highly scalable interconnection between computers, peripherals, and networks.

Fibre Channel transport A protocol service that supports communication between Fibre Channel service providers.

FID Fabric ID. Unique identifier of a fabric in a meta-SAN.

firmware The basic operating system provided with the hardware.

FL_Port Fabric loop port. A port that is able to transmit under fabric protocol and also has arbitrated-loop capabilities. Can be used to connect an NL_Port to a switch. *See also* F_Port, Fx_Port.

flash Programmable nonvolatile RAM (NVRAM) memory that maintains its contents without power.

frame The Fibre Channel structure used to transmit data between ports. Consists of a start-of-frame delimiter, header, optional headers, data payload, cyclic redundancy check (CRC), and end-of-frame delimiter. There are two types of frames: link control frames (transmission acknowledgements and so forth) and data frames.

FS Fibre Channel service. A service that is defined by Fibre Channel standards and exists at a well-known address. For example, the Simple Name Server is a Fibre Channel service.

FSPF Fabric shortest path first. The HP StorageWorks routing protocol for Fibre Channel switches.

FTP File Transfer Protocol.

Fx_Port A fabric port that can operate as either an F_Port or FL_Port. *See also* FL_Port.

G_Port Generic port. A port that can operate as either an E_Port or an F_Port. A port is defined as a G_Port when it is not yet connected or has not yet assumed a specific function in the fabric.

gateway Hardware that connects incompatible networks by providing translation for both hardware and software. For example, an ATM gateway can be used to connect a Fibre Channel link to an ATM connection.

GBIC Gigabit interface converter. A removable serial transceiver module that allows gigabaud physical-level transport for Fibre Channel and gigabit Ethernet.

Gbps Gigabits per second (1,062,500,000 bits per second).

GBps Gigabytes per second (1,062,500,000 bytes per second).

HBA Host bus adapter. The interface card between a server or workstation bus and the Fibre Channel network.

header A Fibre Channel frame has a header and a payload. The header contains control and addressing information associated with the frame.

host A computer system that provides end users with services like computation and storage access.

IFL Interfabric link. A connection between a router and an edge fabric. Architecturally, these can be of type EX_Port-to-E_Port or EX_Port-to-EX_Port.

initiator A server or workstation on a Fibre Channel network that initiates communications with storage devices. *See also* target.

interswitch link *See* ISL.

IOD In-order delivery. A parameter that, when set, guarantees that frames are either delivered in order or dropped.

IP Internet Protocol. The addressing part of TCP.

IQN iSCSI qualified name.

iSCSI Internet Small Computer Systems Interface. A protocol that defines the processes for the transfer of block storage applications over TCP/IP networks by encapsulating SCSI commands into TCP and transporting them over the network via IP.

iSCSI Gateway Service The HP StorageWorks multiprotocol SAN routing service that maps the FCP protocol to the IP transport. This service projects iSCSI hosts onto the backbone fabric of a gateway switch.

ISL Interswitch link. A Fibre Channel link from the E_Port of one switch to the E_Port of another. *See also* E_Port.

JBOD Just a bunch of disks. A number of disks connected in a single chassis to one or more controllers. *See also* RAID.

L_Port Loop port. A node port (NL_Port) or fabric port (FL_Port) that has arbitrated-loop capabilities. An L_Port can be in either Fabric Mode or Loop Mode.

LED Light-emitting diode. An indicator that shows the status of elements on a switch.

Loop Mode One of two possible modes for an L_Port, in which the L_Port is in an arbitrated loop, using loop protocol. An L_Port in Loop Mode can also be in Participating Mode or Nonparticipating Mode.

LSAN Logical storage area network. An LSAN enables device and storage connectivity that spans two or more fabrics. The path between devices in an LSAN can be local to a fabric or cross one or more MP Routers and one or more backbone fabrics.

LSAN zone The mechanism by which LSANs are administered. An MP Router attached to two fabrics listen for the creation of matching LSAN zones on both fabrics. If detected, it creates phantom domains and FC-NAT entries as appropriate, and insert entries for them into the name servers on the fabrics. LSAN zones are compatible with all standard zoning mechanisms.

Mbps Megabits per second.

metro-SAN The collection of all devices, switches, edge and backbone fabrics, LSANs, and MP Routers that make up a physically connected but logically partitioned storage network. LSANs span between edge fabrics using MP Routers. In a data network, this would simply be called *the network*. An additional term is required, however, to specify the difference between a single-fabric network (SAN), a multifabric network without cross-fabric connectivity (dual-redundant fabric SAN), and a multifabric network with connectivity (meta-SAN).

metric A relative value assigned to a route to aid in calculating the shortest path (1000 at 1 Gbps, 500 at 2 Gbps).

MIB Management Information Base. An SNMP structure to help with device management, providing configuration and device information.

MP Router Multi-protocol Router. A platform running the HP StorageWorks Fibre Channel Routing Service or FC-to-FC routing. Enables two or more fabrics to share resources (such hosts or storage devices) without merging those fabrics. The platform could simultaneously be used as an MP Router and as an FCIP tunnel or iSCSI gateway.

MSRS Multiprotocol SAN Routing Services. An optionally licensed software bundle available on certain HP StorageWorks platforms, such as the MP Router, that includes the Fibre Channel Routing Service, the iSCSI Gateway Service, and the FCIP Tunneling Service.

N_Port Node port. A port on a node that can connect to a Fibre Channel port or to another N_Port in a point-to-point connection. *See also* NL_Port, Nx_Port.

Name Server Simple Name Server (SNS). A switch service that stores names, addresses, and attributes for up to 15 minutes and provides them as required to other devices in the fabric. SNS is defined by Fibre Channel standards and exists at a well-known address. Also called *directory service*.

NAS Network-attached storage. A disk array connected to a controller that gives access via a LAN.

NL_Port Node loop port. A node port that has arbitrated-loop capabilities. Used to connect an equipment port to the fabric in a loop configuration through an FL_Port. *See also* N_Port, Nx_Port.

node A Fibre Channel device that contains an N_Port or NL_Port.

NS Name Server. The service provided by a fabric switch that stores names, addresses, and attributes related to Fibre Channel objects. Can cache information for up to 15 minutes. Also known as a *Simple Name Server* or *directory service*. *See also* simple name server (SNS).

Nx_Port A node port that can operate as either an N_Port or NL_Port.

originator The Nx_Port that originated an exchange.

OX_ID Originator ID or exchange ID. The exchange ID assigned by the originator port.

parallel The simultaneous transmission of data bits over multiple lines.

payload A Fibre Channel frame has a header and a payload. The payload contains the information being transported by the frame; it is determined by the higher-level service or FC_4 upper-level protocol. There are many different payload formats, based on protocol.

persistent error log Error messages of a high enough level (by default, Panic or Critical) are saved to flash memory on the switch instead of to RAM. These messages are saved over reboots and power cycles, constituting the persistent error log. Note that each CP on an HP StorageWorks Core Switch 2/64 has its own unique persistent error log.

phantom domain *See* xlate domain.

PID Port identifier. *See also* core PID.

point-to-point A Fibre Channel topology that employs direct links between each pair of communicating entities. *See also* topology.

port In an HP StorageWorks switch environment, an SFP or GBIC receptacle on a switch to which an optic cable for another device is attached.

port address In Fibre Channel technology, the port address is defined in hexadecimal. In HP StorageWorks Fabric OS, a port address can be defined by a domain and port number combination or by area number. In an ESCON Director, an address that specifies port connectivity parameters assigns link addresses for attached channels and control units.

port log A record of all activity on a switch, kept in volatile memory.

port name A user-defined alphanumeric name for a port.

POST Power-on self-test. A series of tests run by a switch when it is turned on.

principal switch The first switch to boot up in a fabric. Ensures unique domain IDs among roles.

private device A device that supports arbitrated-loop protocol and can interpret 8-bit addresses, but cannot log in to the fabric.

protocol A defined method and set of standards for communication. Determines the type of error-checking, the data-compression method, how sending devices indicate an end of message, and how receiving devices indicate receipt of a message.

public device A device that supports arbitrated-loop protocol; it can interpret 8-bit addresses and can log in to the fabric.

QuickLoop An HP StorageWorks software product that allows multiple ports on a switch to create a logical loop. Devices connected via QuickLoop appear to each other as if they are on the same arbitrated loop.

R_A_TOV Resource allocation time-out value. The maximum time a frame can be delayed in the fabric and still be delivered. *See also* E_D_TOV.

RAID Redundant array of independent disks. A collection of disk drives that appear as a single volume to the server and are fault tolerant through mirroring or parity checking. *See also* JBOD.

receiver A device that performs detection and signal processing.

route As applied to a fabric, the communication path between two switches. Might also apply to the specific path taken by an individual frame, from source to destination. *See also* FSPF.

routing The assignment of frames to specific switch ports, according to frame destination.

SID Source ID. Refers to the native port address (24-bit address).

SAN Storage area network. A network of systems and storage devices that communicate using Fibre Channel protocols. *See also* fabric.

scalability One of the properties of a SAN: the size to which a SAN topology can grow port and switch counts with ease.

SCSI Small Computer Systems Interface. A parallel bus architecture and a protocol for transmitting large data blocks to a distance of 15 to 25 meters.

SCSI-3 A SCSI standard that defines transmission of SCSI protocol data over different kinds of links.

sequence A group of related frames transmitted in the same direction between two N_Ports.

serial The transmission of data bits in sequential order over a single line.

server A computer that processes end-user applications or requests.

SFP Small-form-factor pluggable. A transceiver used on 2 GBps switches that replaces the GBIC.

simple name server (SNS) A switch service that stores names, addresses, and attributes for up to 15 minutes and provides them as required to other devices in the fabric. SNS is defined by Fibre Channel standards and exists at a well-known address. Also called *directory service or name server.*

SNMP Simple Network Management Protocol. An Internet management protocol that uses either IP for network-level functions and UDP for transport-level functions, or TCP/IP for both. Can be made available over other protocols, such as UDP/IP, because it does not rely on the underlying communication protocols. *See also* community (SNMP).

SNS *See* simple name server (SNS).

storage A device that stores data, such as a disk or tape.

switch A fabric device providing bandwidth and high-speed routing of data via link-level addressing.

switch name The arbitrary name assigned to a switch.

switch port A port on a switch. Switch ports can be E_Ports, F_Ports, or FL_Ports.

syslog Syslog daemon. Used to forward error messages.

T11 A standards committee chartered with creating standards for Fibre Channel.

target A storage device on a Fibre Channel network. *See also* initiator.

TCP/IP Transmission Control Protocol Internet Protocol.

Telnet A virtual terminal emulation used with TCP/IP. Telnet is sometimes used as a synonym for the HP StorageWorks Fabric OS CLI.

topology As applied to Fibre Channel technology, the configuration of the Fibre Channel network and the resulting communication paths allowed. There are three possible topologies:

- **Point to point.** A direct link between two communication ports.
- **Switched fabric.** Multiple N_Ports linked to a switch by F_Ports.
- **Arbitrated loop.** Multiple NL_Ports connected in a loop.

translate domain *See* xlate domain.

trap (SNMP) The message sent by an SNMP agent to inform the SNMP management station of a critical error. *See also* SNMP.

trunking In Fibre Channel technology, a feature that enables distribution of traffic over the combined bandwidth of up to four ISLs between adjacent switches, while preserving in-order delivery.

tunneling A technique for enabling two networks to communicate when the source and destination hosts are both on the same type of network, but are connected by a different type of network.

U_Port Universal port. A switch port that can operate as a G_Port, E_Port, F_Port, or FL_Port. A port is defined as a U_Port when it is not connected or has not yet assumed a specific function in the fabric.

UDP User Datagram Protocol. A protocol that runs on top of IP and provides port multiplexing for upper-level protocols.

well-known address For Fibre Channel technology, a logical address defined by Fibre Channel standards as assigned to a specific function and stored on the switch.

WWN World Wide Name. An identifier that is unique worldwide. Each entity in a fabric has a separate WWN.

xlate domain Translate domain. A router virtual domain that represents an entire fabric. Device connectivity can be achieved from one fabric to another, over the router and through this virtual domain, without merging the two fabrics. Also known as a *phantom domain*.

zone A set of devices and hosts attached to the same fabric and configured as being in the same zone. Devices and hosts within the same zone have access to others in the zone but are not visible to any outside the zone.

zone configuration A specified set of zones. Enabling a configuration enables all zones in that configuration. *See also* defined zone configuration, enabled zone configuration.

zoning A feature in fabric switches or hubs that allows segmentation of a node by physical port, name, or address.

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